January 1981

Smithsonian

Tentacled tube worm is just one of jewels on a closely studied tropical reef (p. 34)

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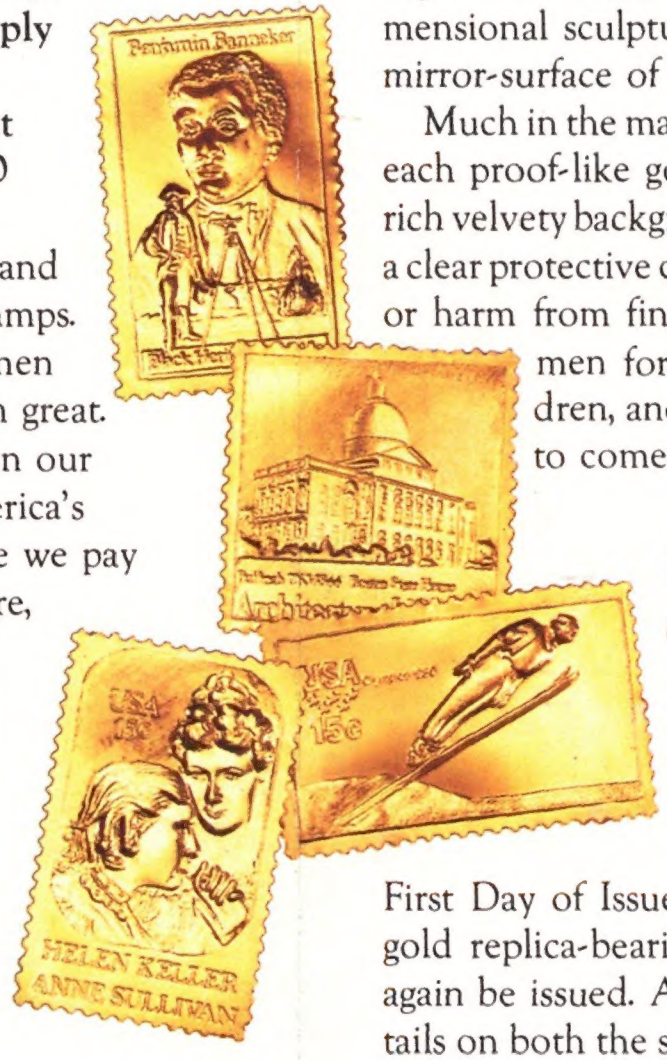

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ABOVE: A skilled engraver puts the final touches on the master model from which 22kt gold stamp replicas will be produced.

Shown here are a master model (center), engraving tools, and sheets of 22kt gold foil from which gold stamp replicas will be created.

Covers shown smaller than actual size.

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The 1980 Winter Olympics
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NOTE: The stamps and replicas shown in this presentation are from past issues and are shown for illustrative purposes only. You will receive replicas of future U.S. Commemorative Stamps as they are issued.

(continued from previous page)

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January 1981

Smithsonian

Volume 11, Number 10

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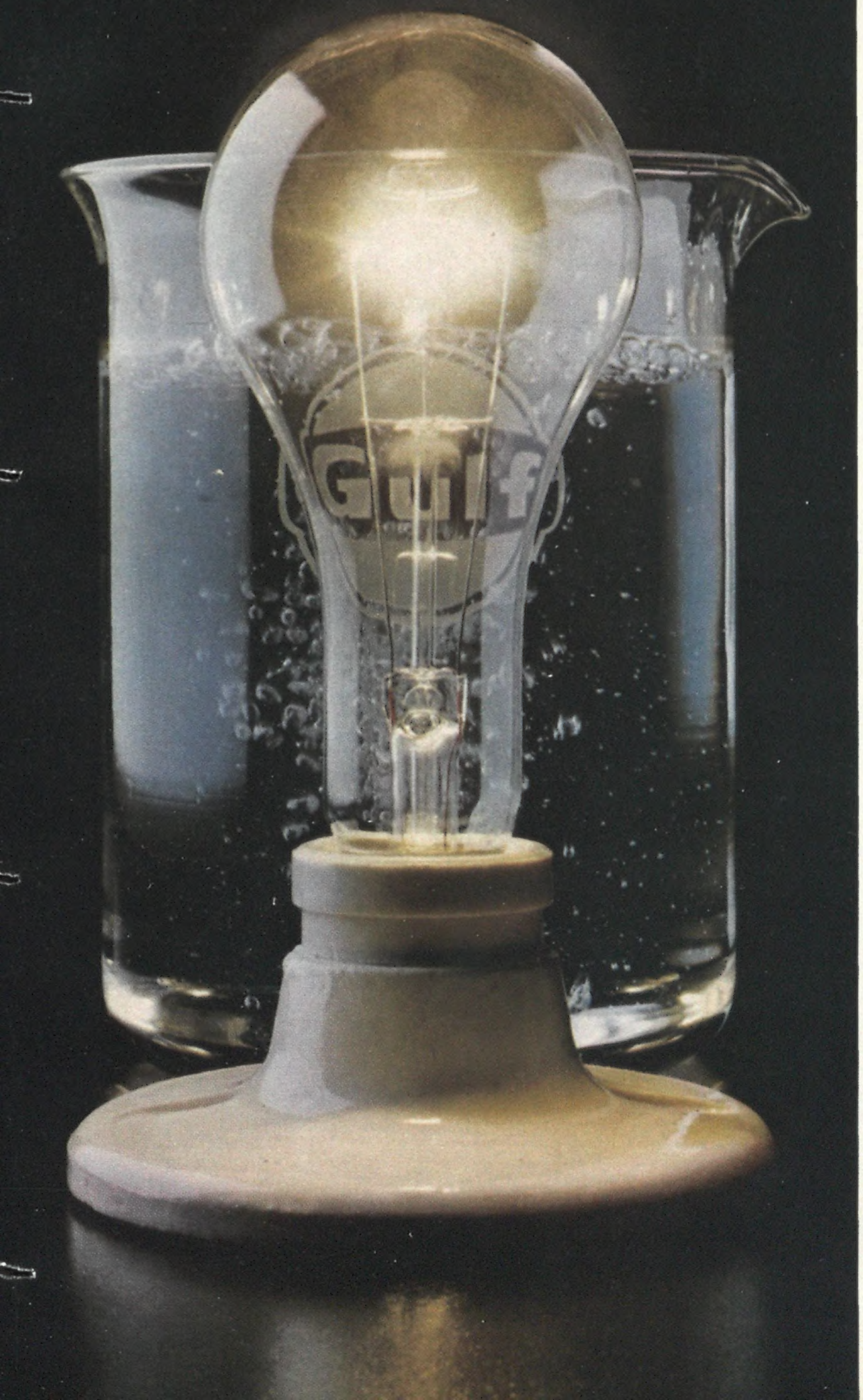
"At Gulf, we're working on a way to light lights, cook meals, and heat houses with the energy stored in water."



"You probably remember from grade-school science that water is two parts hydrogen and one part oxygen," says Dr. John Norman.

"Here at General Atomic Company, a subsidiary 50% owned by Gulf Oil, a project is under way to extract hydrogen from water for use as a fuel: for heating, cooking, or anything that now uses petroleum or natural gas.

"There are 326 million cubic miles of water on earth, and hydrogen in every drop—a natural energy resource that won't run out."

"The extraction process is called thermochemical water-splitting. We know it works because we've done it. But it takes high temperatures – about 1600° F – so it's rather expensive.

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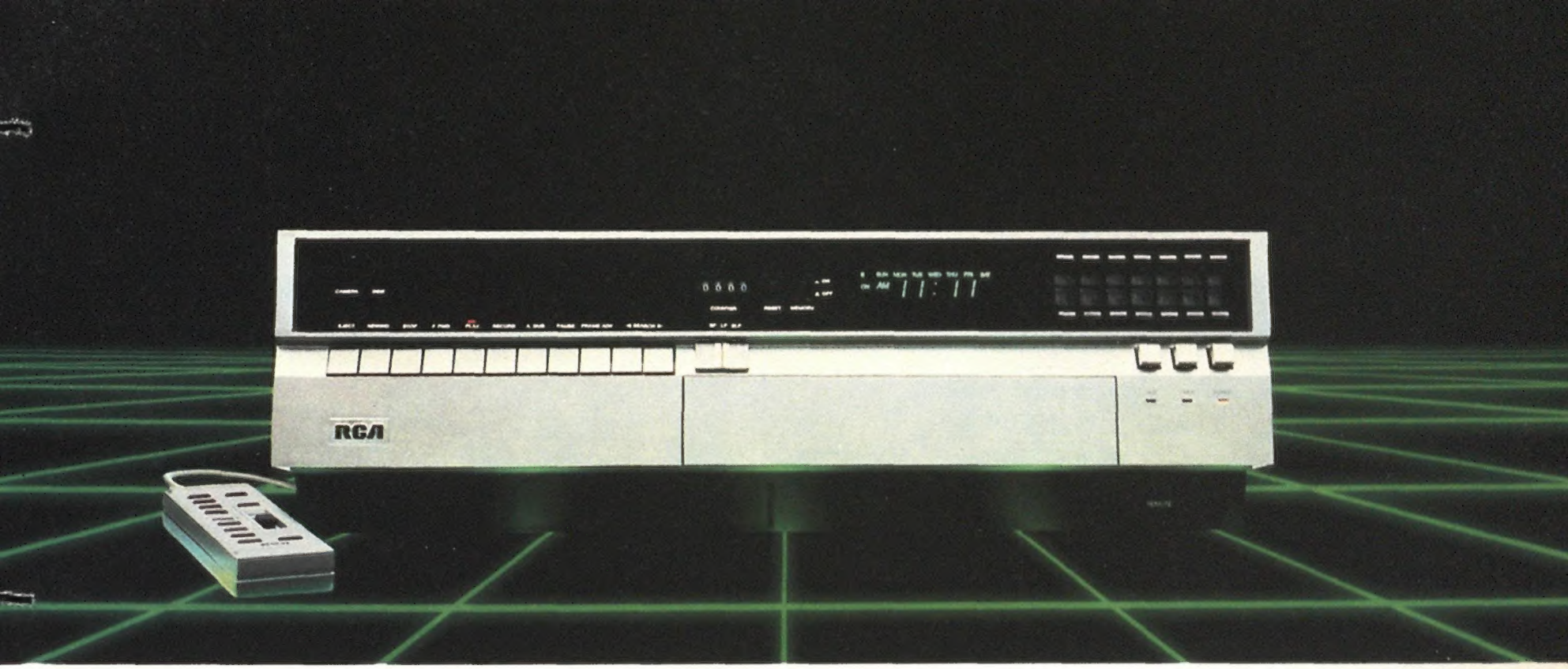

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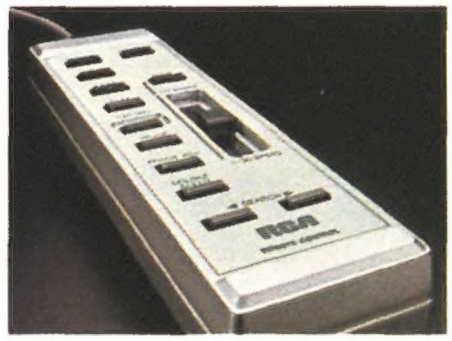

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Secretary Ripley's comments

The view from the castle

A portion of a tropical coral reef is alive and thriving in a Smithsonian tank, creating an opportunity for close-at-hand research

A new exhibit at the Smithsonian's Museum of Natural History symbolizes an aspect of museums often overlooked. This is the degree of active research which is carried on, day and night, behind the scenes. It is not always possible to demonstrate research at work. Often biologists and geologists carry out their studies in the field, far away from the exhibits. At other times, the detailed equipment or the bulk of specimens require working in laboratories that are inaccessible to the public.

One field of study that, rather unexpectedly, has proved exhibit-worthy is the life of a tropical coral reef. After several years in the basement of the museum, working almost in the style of a Rube Goldberg cartoon, Walter H. Adey, a curator in the Department of Paleobiology, has perfected a closed-system coral reef which lives and reproduces away from the open sea.

This is a first in marine biology. Among many attempts to keep coral reef communities alive in aquariums, only three have succeeded—in New Caledonia, on the Red Sea and in Havana. These are "open" systems fed by flowing seawater passing through tanks and out to the sea again. "Closed" systems in tanks separated from the sea have not kept the reef organisms going.

But Adey's invention, which is described in the article beginning on page 34 of this issue, is entirely closed. The seawater recirculates, with a little distilled water being introduced from time to time to make up for evaporation. Two large buckets, alternately filling and emptying (this is what made me think of Rube Goldberg) create artificial waves.

For more than four years, Adey's pilot system in the basement has been alive and growing. Now a whole new exhibit has been created upstairs in the Sea Life Hall. In the tank we find a reef of living coral, facing the open sea with waves churning up its face, while behind there is a calm lagoon, fed through but protected from wave action, just as in a real environment. Many of the organisms in the tank were brought from the magnificent Caribbean reef off St. Croix. The combination of wave action (essential to the life of a reef) and overhead lamps simulating daylight in the tropics insures survival. Some 300 plants and animals currently inhabit the system. In a year there will be more of these communally living creatures—all in focus, and in balance with one another.

The possibilities for the study of life in these great oases in the otherwise rather barren tropical seas—the coral reefs—are endless. By using such a self-contained system, available for study at close hand, it has already been possible to discover new and unrecognized forms of algae, formerly living on the reefs at large but cryptically disguised in their habitat. The interactions of algae in the web of marine life may prove to have practical application in our energy-short world.

No wonder, then, that this museum demonstration is supported with enthusiasm by the National Science Foundation, as well as by other branches of government and by corporations alert, all of them, to the possibilities of learning from museum scientists something of the everyday world around us. Nature is full of riddles whose answers still escape us.

S. Dillon Ripley

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Letters to the Editor

Grant Wood

Dear Sir: My sincere thanks for the delightful Wanda Corn article on Grant Wood and his work in your November issue. As a native Iowan who is old enough to remember Mr. Wood's beginnings, it is a special pleasure to see someone who has been able to capture so much of the artist's personality as well as an appreciation of his acceptance by the Iowa of today. I think the Eastern seaboard folks are finally beginning to realize there are things other than sod houses, cornfields and country yokels this side of the Hudson River.
George A. Wick
Sibley, Iowa

Dear Sir: Grant Wood's *American Gothic* brought back memories of my hometown of Eldon, Iowa, especially as it was in the 1930s. Those were very tough times; the misery index in that era was made up of unemployment, ruinously low farm prices, droughts and dust storms. With nothing much else to do, restless Eldonians built a nine-hole golf course, long-since abandoned, and established a short-lived art gallery in a vacant house on the main street. It was the art gallery that brought Grant Wood and another fine Iowa artist, Edward Rowan, to Eldon.

The visiting artists were amused to hear the nicknames that Eldonians applied not only to citizens but also to localities. The area across the Des Moines River was "Hacklebarney"; to the north and east was "Turkey Scratch." Within town limits there was the "Hill" and the "Flat." The house that inspired Wood's *American Gothic* stood in a section that was called, for some reason that I forget, "Pull Tail."
Harry W. Henderson
Washington, D.C.
According to a local historian, "Pull Tail" derived its name from the fact that the area was once the location of the Rock Island stockyard. To get the exhausted cattle moving, workers would pull their tails. Ed.

Wild dogs

Dear Sir: I realize that SMITHSONIAN does not attune its articles to protect the sensibilities of its readers. Animals in the wild obviously live according to their natural instincts. However, your editors have the option of dramatizing whatever facet of that animal behavior they wish.

Consequently, I found James Malcolm's article, "African wild dogs play every game by their own rules," offensive. Both the pictures and the text seemed to play up the gory details of their lives. Unquestionably, survival is the prime motivating factor, and I cannot fault the wild dogs in their quest for prey.

My distaste stems from the author's seeming preoccupation with the stalking of large prey, particularly the zebra. The opening picture of the pack of dogs rending the zebra foal apart, and the last sentence—"The Genghis pack is still too small to tackle zebras, but perhaps with a few pups surviving the tradition will persist"—implies an excessive concern with violence.
Jean Lauren
Philadelphia
Nature is often harsh, and the attack on the zebra foal is a reminder of that fact. However, the zebra is not an easy target for wild dogs. As the naturalist George Schaller writes: "In contrast to wildebeest . . . zebra foals are seldom killed even though they are abundant at the same time as the wildebeest. Zebra foals are members of a cohesive family unit and a fleeing herd characteristically remains tightly bunched, making it difficult for the dogs to attack the foals. In addition, stallions tend to lag behind the herd and bite and kick at the dogs." Ed.

Afghanistan

Dear Sir: Your article and pictures on Afghanistan were incredible and well up to SMITHSONIAN standards. After reading

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your colorful description of the Pathans, I hope you will publish a close-up portrait of one of them [see Pathan woman

above, taken from the book, *Afghanistan: Paradise Lost*, with text and photographs by Roland and Sabrina Michaud].
Cappi Phillips
Unionville, Indiana

Minimal aircraft

Dear Sir: By publishing Jan W. Steenblik's article, "In reinventing the small airplane, less can be more," you have provided this reader with the means to an adventure.

The Hudson River flows by my Jersey City home and it is almost devoid of the commercial traffic of the past, particularly on weekends, when the sea gulls, pigeons and a few pleasure boats are its sole occupants. The river provides a wide, flat and long expanse, with dependable prevailing winds.

This river is just waiting for that pontooned ultralight illustrated in those beautiful color photographs by Joseph J. Lucas jr.

You have given me something to do this winter (build one), spring (generate the courage), summer (fly one) and next winter (brag about it). Now, all I need is where to get the instructions.
Raymond J. Connelly
Jersey City

Reader Connelly and others who have inquired can get information on their nearest manufacturer by writing EAA Ultralight Association, P.O. Box 229, Hales Corners, Wisconsin 53130. Ed.

Hope Ryden

Dear Sir: I was fascinated by Patricia Curtis' article on Hope Ryden and her efforts to save the mustang and other wildlife. However, I was disturbed by these statements: "One secret Hope Ryden guards is her age. Another mystery is why she has never married." I feel certain that had the subject of the article been a man, the author would not have found it necessary to comment on his age and marital status. I am sensitive to the presence of such parenthetical sexism in the pages of your otherwise excellent magazine.
Janet Simon
Washington, D.C.

"Phys/phren"

Dear Sir: Marion Mainwaring's entertaining article on "phys/phren" should be of particular interest to criminal trial lawyers. In the famous trial of William Freeman, a black accused of the mass murder of a white family in upstate New York in the 1840s, William Seward attempted to prove the defendant's insanity by calling phrenologists and physiognomists as expert witnesses. One testified that the external evidence of Freeman's insanity was found "in his general manners, the expression of his countenance, and the idiotic smile." Seward later went on to greater "folly" as Lincoln's Secretary of State. A century from now, I'm sure, those reading the transcripts of psychiatric testimony at today's criminal trials will find themselves equally amused.

Physiognomy is alive and well among the criminal trial lawyers of our day. In a 1974 book entitled *Fundamentals of Criminal Advocacy*, F. Lee Bailey and Henry B. Rothblatt offer these helpful hints on how to pick a jury:

"Generally speaking, the heavy, round-faced, jovial-looking person is the most desirable. The undesirable juror is quite often the slight, underweight and delicate type. His features are sharp and fragile, with that lean 'Cassius' look. The athletic-looking juror is hard to categorize. Usually he is hard to convince;

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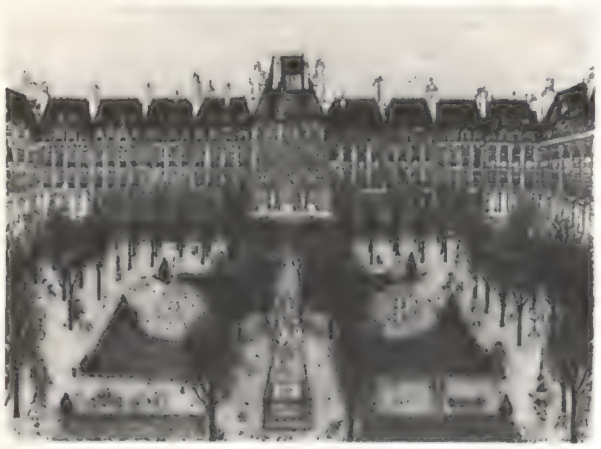

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Gerald F. Uelmen, Professor of Law
Loyola Law School
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Ralph and Terry Kovel

Dear Sir: In straining for color author Scott Eyman has overreached himself in his article on the antique-collecting Kovels. His description of buyers and sellers at Renninger's markets as a "motley assemblage" of "Old Testament prophets, bike-gang rejects, aging hippies, disbarred diamond merchants, carny barkers, faded Roseland ballroom queens" strikes me as patronizing.

While the flea and farmer's markets, auctions and shows don't lack for colorful characters, the vast majority are the "just plain folks" Mr. Eyman also mentions. The real tone of this scene is business.
Fritz Davis, Editor
The Jersey Devil
Lambertville

Sound and sites of jazz

Dear Sir: S. Frederick Starr's article, "Recording echoes from the years when jazz was born," reminded me of a time in the early part of 1918 when I was a young Naval aviator awaiting transportation for duty overseas. I was delayed some two weeks in New York and during that time spent every possible evening dancing to a wonderful new kind of music as it was played by Nick LaRocca and his "Original Dixieland Jazz Band." They were playing at Reisenweber's at the time, and to me they were the greatest.

Time has passed. I am now 85 years old, and I have never heard any jazz group to compare with them.

I remember hearing several years ago that someone interviewed the trombonist and the drummer, said to be the only ones left of the original group. I wonder if any organization has dubbings of the original recordings so that I might prove to myself after 62 years when it comes to jazz they truly were the greatest.
Perry Wood, Captain USNR (Ret.)
Van Nuys, California
The trombonist was Eddie Edwards and the drummer Tony Spargo; both have since died. The Tulane Jazz Archives has the entire collection of the "Original Dixieland Jazz Band." Ed.

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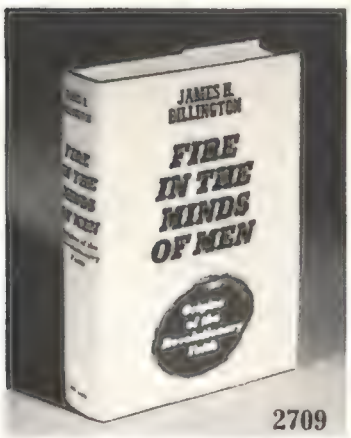

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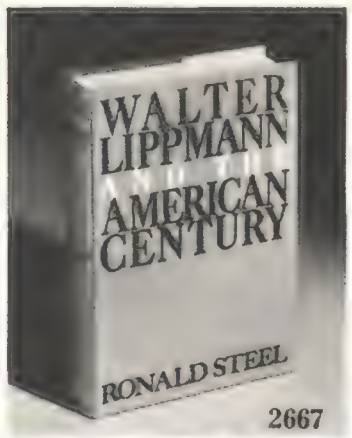

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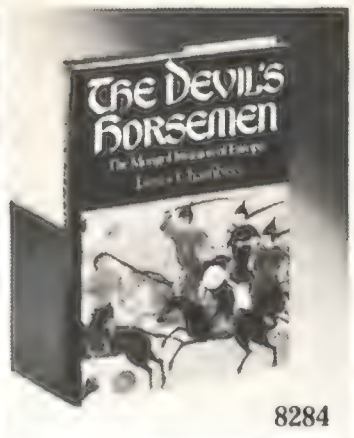

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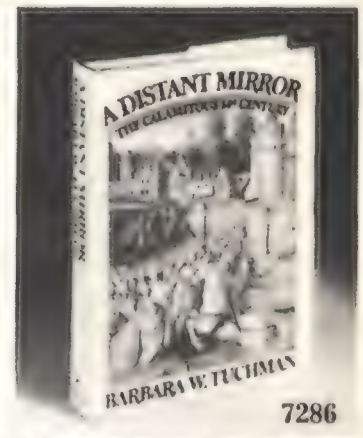

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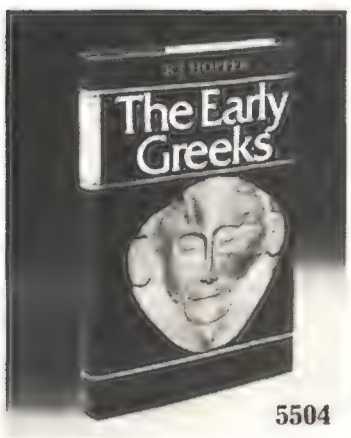

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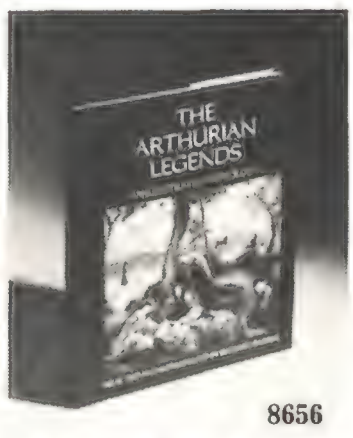

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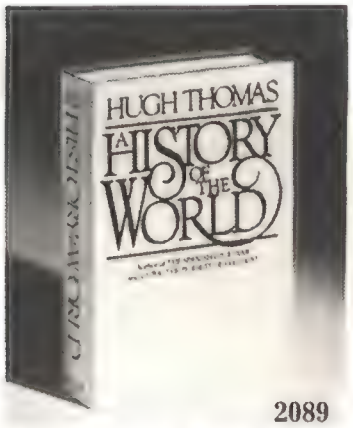

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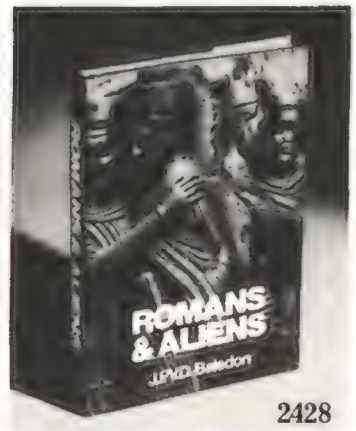

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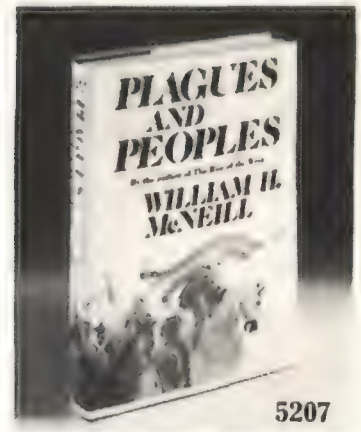

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Phenomena, comment and notes

Researchers flock to Mount Saint Helens to find out what has survived its eruptions—and what has not

The last thing the Cascade Range needed was another devastated mountain. It already had Crater Lake, that deep blue hole-in-the-ground where Mount Mazama once stood; and Lassen Peak, shattered 67 years ago; and Broken Top Mountain in Oregon, looking like a giant tooth that lost a filling. But humans have nothing to say about holding a mountain back from exploding, and now the range has a new broken top, the remains of Mount Saint Helens in Washington State, which blasted itself apart last May 18 (SMITHSONIAN, July 1980) and may keep on rumbling and spewing out gas and ash for the rest of this century.

I'm not eager to go back to Saint Helens, which was the beautiful, symmetrical Fujiyama of western America when I spent some days on it a few years ago, but is now a haggard wreck. One would rather remember it as it used to be: a playground for Roosevelt elk, black-tailed deer and black bear, snow ptarmigan and mountain goats; a happy hunting ground for huckleberry hunters; a fragrant feasting place for birds, bees and butterflies. "Of all the Cascade volcanoes," I once wrote, "Saint Helens, a pristine mound of snow, looking neatly brushed in the morning, is my favorite."

When I was there I spent the night with Jim Ray, a retired Forest Service ranger, in the rustic cabin he had built on a flank of the mountain. In the morning I dipped our coffee water out of a

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Artists' Aegis
INCORPORATED

clear stream that flowed nearby, in the shadow of the mountain. That afternoon the two of us dropped in on Harry Truman, an irascible octogenarian who had run the somewhat dilapidated Spirit Lake Lodge for 51 years, and cruised the lake with him in one of his boats.

Last spring when the quaking mountain gave notice that it was about to blow up, Jim Ray prudently put a safe distance between himself and Saint Helens. He moved to Anderson Island, 70 miles away in Puget Sound. Stubborn old Harry Truman stayed on. Jim Ray has gone back, to fly for four hours around the mountain in a Forest Service plane, in hopes of seeing at least the chimney of his cabin. But it has all disappeared under the mud, ice and pyroclastic flows that the eruption sent forth. So have Harry Truman and his lakeside lodge.

In 275 square miles blasted by an explosion perhaps 500 times as forceful as the atomic bomb dropped on Hiroshima, it seemed at first that nothing would ever survive. After all, two cubic kilometers of mountainside—enough to fill the Washington, D.C., Mall from the Capitol to the Lincoln Memorial to the depth of eight Washington monuments—were instantly removed from Saint Helens' north side. Ash-laden hurricane-force winds—perhaps as hot as 300 degrees C near the volcano—killed virtually every living thing in their path.

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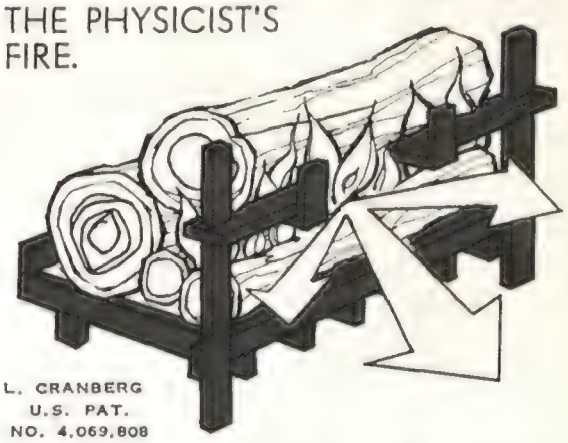

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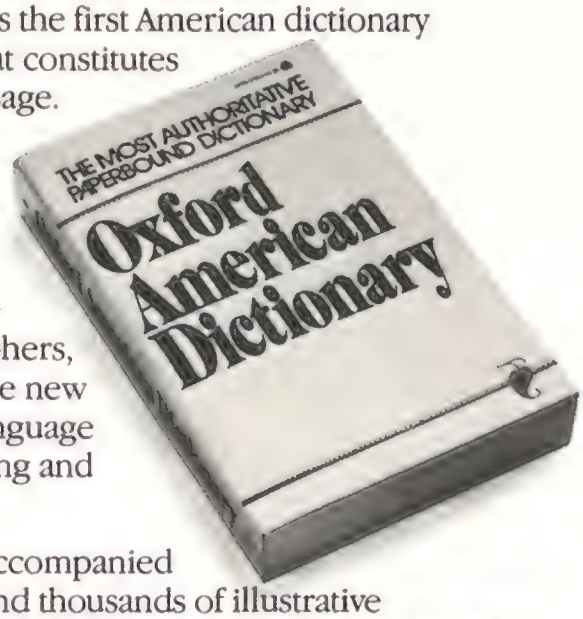

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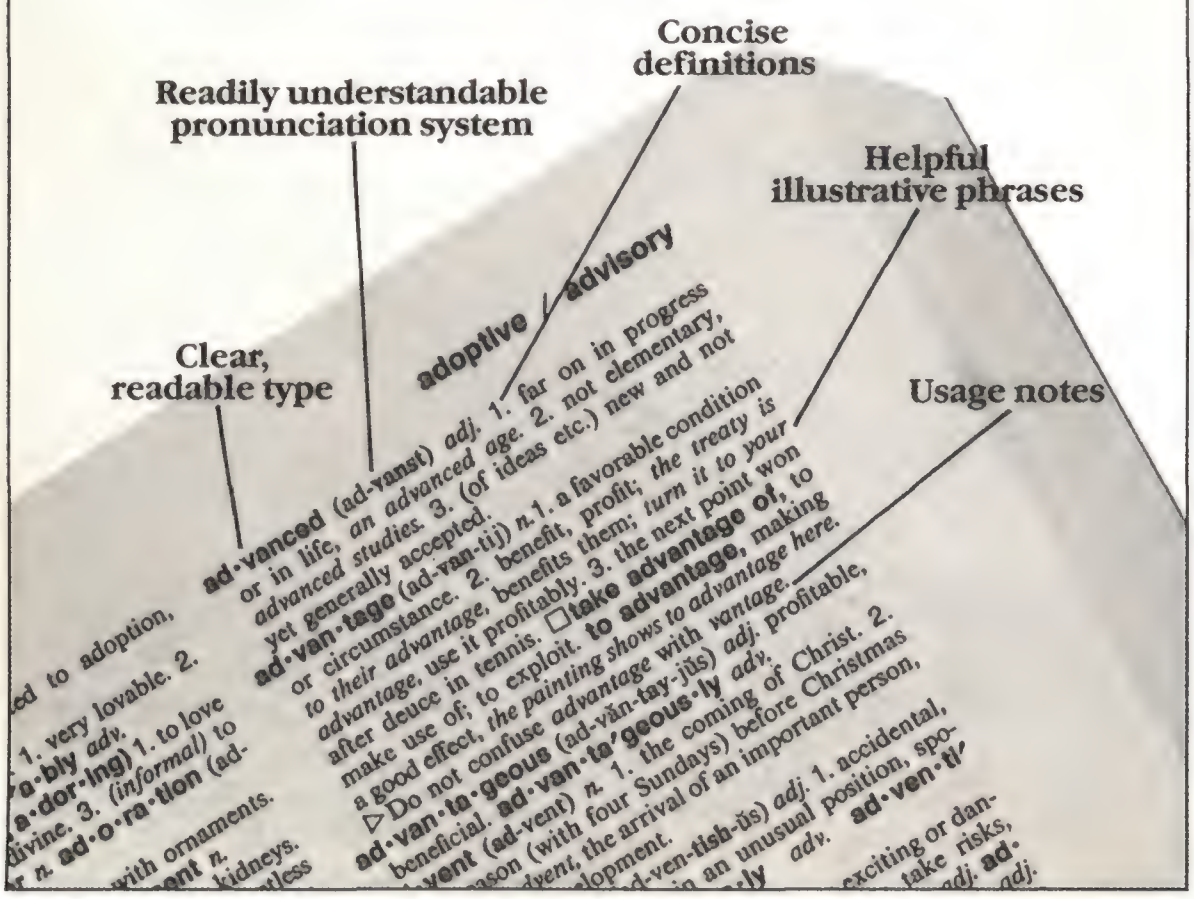
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Exposed tree burned, buried tree lived.

But by some miracle, some things did survive. How and why is one double-barreled question—among many—that has engaged more scientists in the past few months than have ever investigated a North American volcano. The U.S. Geological Survey, the Forest Service and the Washington State Fish and Game Commission have had men on the scene since before the eruption. The National Science Foundation has committed half a million dollars to 100 researchers at the mountain.

There have been seminars galore on the mountain's past and future. The Smithsonian held one in the fall, and a big, rapt audience heard Dr. Richard Fiske, geologist and director of the National Museum of Natural History, discuss plate tectonics, the shifting movement of huge slabs of the Earth's crust, along the edges of which volcanic eruptions usually occur. One of his staff volcanologists, William G. Melson, talked about monitoring trips to Saint Helens; another, Thomas E. Simkin, compared the recent eruptions to past ones around the world.

The other day I went out to George Mason University in northern Virginia to hear Dr. David W. Johnston, an ecologist (he also had been on the Smithsonian panel), talk about what survived and what did not. On leave from the University of Florida to direct ecological studies at the National Science Foundation, he

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has coordinated research at Saint Helens, and has visited it three times since May.

To me, the most interesting thing he talked about was not trees (200 billion board feet of lumber worth more than $500 million, looking today "like a giant game of pickup sticks" which could have built 200,000 homes "or a billion bluebird boxes") but the bees.

"Honey bees," he said, "spend a great deal of their time grooming themselves; ash fell on their wings and bodies as well as on everything else, and when they brushed themselves clean the abrasive ash took away their protective cuticle. Also, ash clogged their tracheas, and they died." Whether more bees will be around in the spring to pollinate any plants they find is anybody's guess.

As for trees, millions of them died too, particularly in the "Red Zone" nearest the mountain, where they were stripped of their branches by those fierce winds, snapped off or uprooted—many of them

Avalanche lily pokes up through ash.

six-foot-thick Douglas firs, quickly coated thickly with pumice ash. Some may, some may not be salvageable. Weyerhaeuser, which owns many of them, has started salvage on 36,500 blasted acres, expects the job will take two years to complete—at an increased logging cost of 25 percent.

The Forest Service, which owns many of them too, is deep in deciding what to do about its own downed Gifford Pinchot National Forest trees. If too many are removed too soon, erosion may destroy the hillsides where they grew.

On north-facing slopes where trees were still shoulder-deep in snow, the tops of small trees were burned off or singed, but their roots, trunks and lower branches were unscathed. Farther out in the "Blue Zone," trees were scorched but may live through this massive ecological insult; only time (for new growing seasons) will tell.

Avalanche lilies, fireweed, lupine and other small plants poked up out of the ash last summer, some spreading not by seeding but by thrusting out from rhizomes under the surface.

In September Dr. Johnston saw Soil Conservation Service helicopters dumping buckets of grass seed and fertilizer on the mountainsides in an attempt to forestall erosion. Then, he says, "some areas turned green, but the grass seed was having a tough time on that ash. The algae grew like mad, however, turning the ash green. But the seeding was not working as well as expected."

The region is not entirely barren of animal life, either, although thousands of game animals and game birds were killed, along with thousands of songbirds, raptors and small mammals. In August a research team led by Dr. James MacMahon of Utah State University found that pocket gophers, burrowing animals which were underground during the eruption, had survived even in the blast area—probably by supporting themselves on bulbs, corms and rhizomes. There may be enough of these resources in some places to carry the gophers through the winter, although by October it appeared that animals at one site may have exhausted their food supply and not survived into the fall.

Elk and deer tracks were seen on the edges of the devastated area. The animals probably wandered into their old haunts from the outside, and while their predators such as coyotes and cougars were gone, there was little food and they did not stay long. A few hummingbirds were seen where fireweed and lilies bloomed and "bird people" have been urging that dead snags be left standing here and there to encourage nesting.

Fish in the streams and lakes had a difficult time of it. Salmon swimming upstream to spawn found the waters leading to their imprinted, ancestral homes blocked. A fish hatchery on the Green River, a Toutle tributary, was engulfed and destroyed in the floods that accompanied the holocaust, and a rearing pond on the Toutle was blocked.

Two University of Washington fish bi-

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ologists, Drs. Quentin J. Stober and Ernest Salo, were running four research projects for the State Fish and Game Commission to determine how much ash and sediment (which erode gill fins and thus can kill fish) the rivers' coho and Chinook salmon and steelhead trout could tolerate. Preliminary conclusions: very young fish last only hours with the amount major rivers now contain, auguring ill for hatchlings trying to reach the sea. Although some adult fish did make it upstream, the main spawning gravels were scoured away by the floods. Salmon spawning grounds in the middle Green were intact, however, and there was evidence some steelhead may have switched to the unscathed nearby Kalama River.

In Spirit Lake, only five miles from what used to be the mountain summit, the water level suddenly rose at least 100 feet as debris and trees slid in. Chemical analysis shows about 100 times as much dissolved organic material as normal. As Dr. Johnston puts it, "Spirit Lake simply stinks." At Meta Lake the remaining fish were undersized and hungry. With no smaller fish and few aquatic insects to tide them over, they may not live to see another spring.

In other high lakes and their wetlands, which were almost irreparably damaged, the tragedy is not only elimination of resident fish and wildlife. Destruction of the riparian vegetation means that nurturing grounds for the young of those creatures are gone for at least five years.

As rough as the winter may prove for plants and animals, there is an even more worrisome possibility: a season of heavy rainfall could wash 400,000 cubic yards of silt down the still partially blocked Toutle and Cowlitz rivers, toward an area where 45,000 people are living. The Corps of Engineers has dredged the Cowlitz seven days a week, 20 hours a day with good results; much silt may be carried through. It has tried to contain material in the Toutle. The National Weather Service estimates a 50-50 chance of moderate flooding before spring comes.

The Washington State Fish and Game Commission says 153 miles of trout and salmon streams were destroyed, along with 26 lakes; they worry about the recreational future of the area—assuming that recreation, as well as research, again will attract people to a region no longer looking neatly brushed and presently too dangerous for them to enter.

—Richard L. Williams

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Linus Pauling, Ph.D.:

ON GOOD NUTRITION FOR THE GOOD LIFE

...in which the two-time Nobel Laureate informs you of his personal approach...his own intake of many vitamins...and why—for your own possible guidance—that intake differs so markedly from conventional recommendations

PUBLISHER'S NOTE: *On the 14th of July last, a British subscriber wrote us to urge a special report. "I would like very much to see a report," he put it, "setting forth an authoritative and reliable proposed daily vitamin dosage for the middle-aged to older person in good health. As to an* authoritative *recommendation covering all the vitamins, and the amounts of each, I haven't a clue! Perhaps one wrap-up report could cover this interesting and important topic. It would certainly be appreciated, I am sure, by most readers." We turned to Dr. Linus Pauling, a long-time member of our Editorial Board, who had only recently given a talk, very much germane, as a guest of the California Institute of Technology's Y's Leaders in America program. Here is that talk, as adapted and updated by Dr. Pauling for Executive Health readers.*

I believe that it is possible by rather simple means, essentially nutritional, to increase the length of life expectancy for young people and middle-aged people (and to some extent, perhaps, old people too) by about 20 years.

Not only can the life expectancy be increased, I believe, but also the length of the period of well-being can be increased by the same amount, or perhaps even a little longer; because it is likely that, as long as the process of aging goes on, the process of deterioration that culminates in death will proceed more rapidly at a late age than an earlier one.

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Around the Mall and beyond

Lucretia Garfield wore this gown for Inaugural ball at the Smithsonian.

When Theodore Roosevelt was getting ready for his 1905 Inauguration, it occurred to someone that the only official medal for the occasion was a mere redo of a medal struck in 1901, when he was inaugurated after the death of William McKinley. So a new medal was ordered, to be designed by the famed artist-sculptor Augustus Saint-Gaudens. Eventually, TR was asked to approve the model. And an onlooker recalled that "Teddy Roosevelt came in about 80 miles an hour, said, 'Bully, bully' and dashed out."

Here it is—the gold 1905 medal. The obverse has an almost Grecian profile of TR. And the Latin, AEQUUM CUIQUE, incidentally, is a nice classical way of referring to what he called the Square Deal. It means "To each what is equitable." The reverse of the medal bears the strutting eagle that made Saint-Gaudens' gold $10 piece famous.

This is one of several Inauguration souvenirs that Herbert R. Collins, a curator of Political History, has gathered at the National Museum of American History. Many go on display this Inauguration month outside the "We the People" exhibit on the second floor. They remind us that the Smithsonian has often figured in these ceremonies.

Theodore Roosevelt's 1905 Inauguration produced this medal by Saint-Gaudens.

Lincoln's second Inaugural ball, for example, was held upstairs in the National Portrait Gallery, which, in 1865, was just the Patent Office, although it had been used as a Civil War hospital. Almost exactly a century ago, Garfield's Inaugural ball took place in the newly built Arts and Industries Building, then called, simply, the National Museum. Mrs. Garfield wore the gown (above) now on display in our First Ladies' exhibit, and her face, like those of the other First Lady manikins, is that of a bust of King Lear's youngest daughter, Cordelia (as imagined by Louisiana artist Pierce F. Connelly in 1865). Lucretia Garfield holds a Bible.

The ball was notable for cramming more than 5,000 people into the museum building, which had not yet accommodated its collections, and for serving this horde no booze. This was a startling departure, essayed in deference to outgoing President Rutherford B. Hayes (he's the one you can't simply call "President Hayes"; you've got to let *all* of it roll out), who was so staunch a teetotaler that

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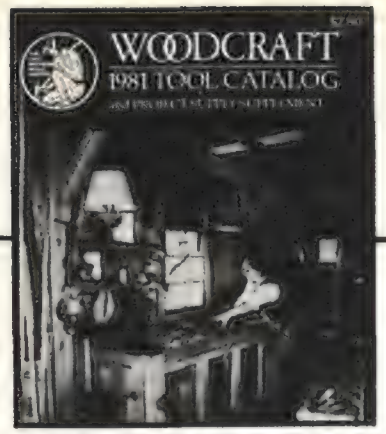

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his wife was called Lemonade Lucy. She's in our First Ladies exhibit, too, of course. I can't remember what she carries in her hand, but you can bet it isn't a bottle.

More recently, the National Gallery was the scene of Truman's 1948 gala, and the National Museum of American History hosted Inaugural balls for Nixon in 1969 and 1973.

Herb Collins notes that the Inauguration ceremony itself has been peripatetic. It's not confined to the East Front of the Capitol, nor to the Capitol, nor to Washington. George Washington took the first oath in New York, the second in Philadelphia. The city of Washington was a-building when John Adams came along, and he was the first to use the White House. But his Inauguration was in Philadelphia.

The tradition of using the Capitol building started with Jefferson, but Monroe had to break it in 1817 because the British had burned the Capitol in the inglorious War of 1812. During World War II, Franklin Roosevelt also broke the tradition by taking his oath on the south portico of the White House. And this year Mr. Reagan will change the East Front habit by doing his stuff on the other side of the Capitol, the West Front, with its view of the Mall—and of seven Smithsonian edifices, plus the National Gallery of Art, along its sides.

George Washington borrowed a Masonic Bible to swear his oath on, and thus started another sort of precedent. The Bible that President Buchanan used will probably be seen on display in the new exhibit, but you won't find one that served John Quincy Adams. That bristly little Yankee felt that his solemn word did quite well enough without help from the Good Book.

Collins also reminds us that travel to and from the ceremony has varied over the years. Washington and Adams rode in carriages. Thomas Jefferson and Andrew Jackson—and, years later, Jimmy Carter—walked. William Henry Harrison (old "Tippecanoe") rode horseback. Harding was the first to ride to the event in a car. We have the wide-open, top-down carriage that Grant used to and from the Capitol in 1873, despite the raw March weather.

Weather has played surprisingly little part in deciding upon the date of Inauguration. George Washington's first oath-taking was on April 30, a fine time

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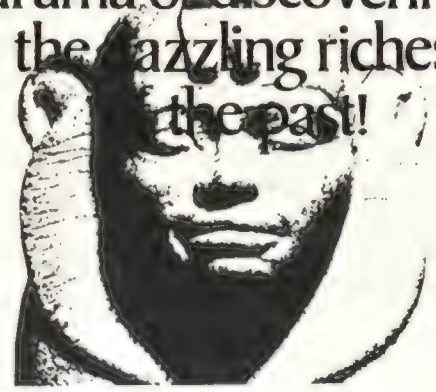

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of year for an occasion filled with vernal hope. But political reality moved the date to March 4 in order to shorten the tenure of lame ducks in Congress.

The trouble is, March is a rotten month in Washington. It can be accused with some justice of having killed William Henry Harrison by pouring cold rain on his bare head as he gave his Inauguration speech in 1841. He died a month later. A good deal of the blame must also fall on the fact that it was such a *long* speech, out there in the rain.

In 1937 the date was reset to January 20, thus reducing even more the lame duck period. January can be even worse in Washington than March, as witness the Inauguration snowstorm that celebrated Kennedy's appearance in 1961. It rendered the Inaugural balls hilarious fiascoes, required a large contingent of troops to get Pennsylvania Avenue ready for the parade and, because of the bitter cold, inspired the rigging of a lectern heater which caught fire while Cardinal Cushing was enlisting heavenly aid for the incoming administration. A splendid day! It always is.

All this information from Herbert Collins comes on the heels of a symposium at the National Portrait Gallery, which is given to discussions of history. So, right on the site of that 1865 Inaugural ball, just above the Hall of Presidents, every one of them beautifully portrayed except Grant (and he's got the best frame), a bunch of people heard many pleasantly titillating things about Teddy Roosevelt, John F. Kennedy, Lyndon B. Johnson and Richard M. Nixon. The speakers were their biographers: Edmund Morris, whose first huge volume on TR is a delight; Theodore Sorensen, Kennedy's special counsel; George Reedy, LBJ's erstwhile press secretary and a former Wilson Scholar here at the Smithsonian; and finally the words of Fawn Brodie about Nixon. Hers were read by the Portrait Gallery historian, Marc Pachter, since Miss Brodie couldn't make it.

This is the second such symposium that I have been to at the Portrait Gallery. I presume that makes them a tradition. I certainly hope so.

Another symposium was held all through a week in November and it dealt with World War II aviation. So I went to that, too, and learned a lot of things I hadn't known back in World War II

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when I was connected with aviation. It was fascinating, but I had the niggling feeling that it might have done me more good—at least made me *feel* better in 1942 and 1943 than in 1980. But the point of most speakers was to reveal things learned since those old days, reasons for uncomfortable surprises.

I love this dimension of the Institution. If you get tired of looking at paintings and exhibits and live animals and dead animals and films and filmstrips and puppets and posters and books and sculptures and gardens and musicians and weavers and you name it—why, go and hook up with a symposium and get your added blast of learning *that* way.

A letter has arrived about the Housatonic, subject of October's column. R. H. Mezejewski of Vancouver, Washington, writes that the river "formed the backyard boundary of my childhood years in Pittsfield, Mass." He recalls "fishing for trout and suckers, catching crayfish and watching muskrats swim between the gnarled roots of a huge elm."

With "the first signs of spring, Grandpa would put on his waders and, with a homemade version of a clam rake, clean the bottom of cans and bottles."

Mr. Mezejewski says that years later he went back with wife and teen-age daughters. The river (presumably before the Housatonic Valley Association got after it) was a mess behind his old house: "a child's bicycle, rotted crates and the remains of a shopping cart. . . . One daughter looked at me and said, 'Dad, you didn't really swim in there, did you?'

" 'The reason the river looks like this,' I explained, 'is that no one cleans it. Your greatgrandpa died six years ago.' "

—Edwards Park

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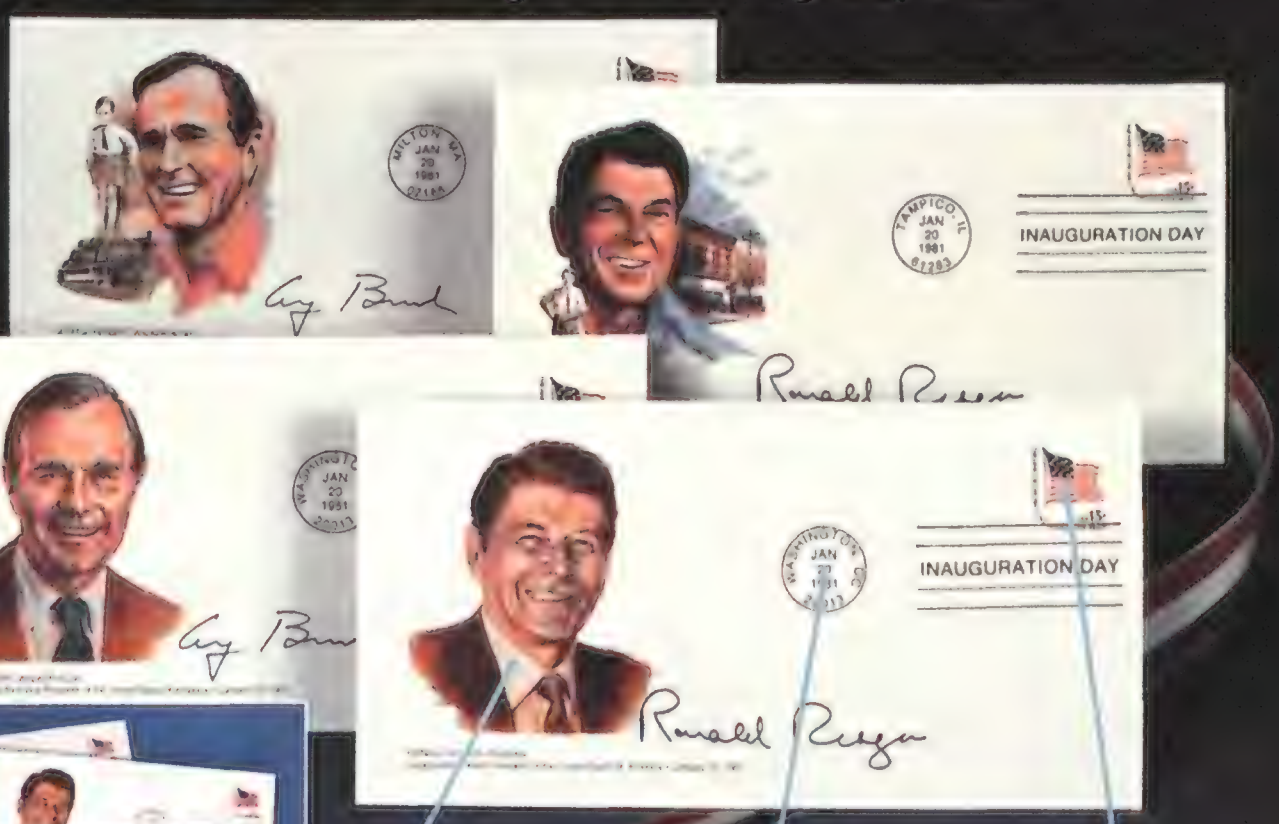

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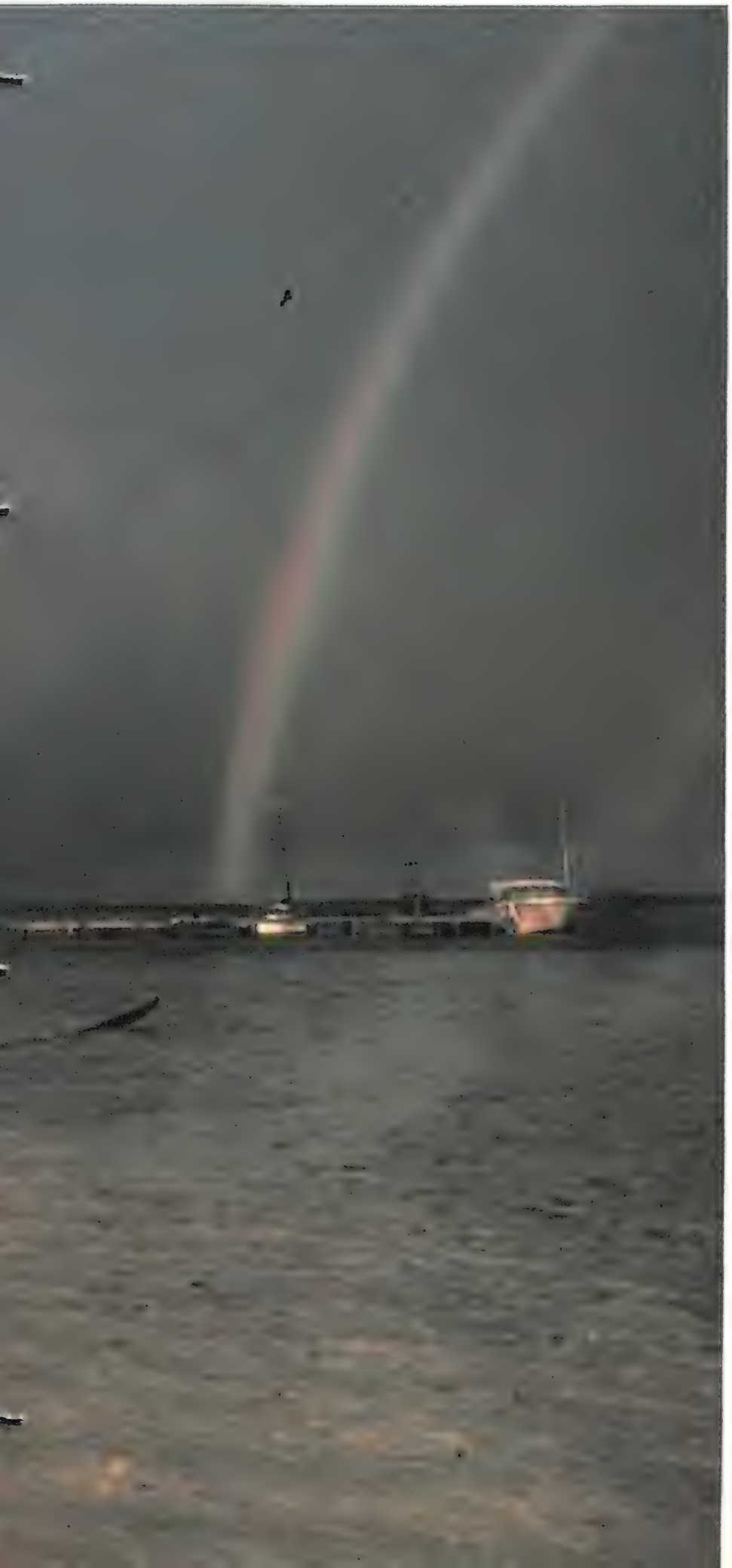
By Lawrence E. Taylor

A coral reef gives up some secrets– as scientists build a reef of their own

Smithsonian divers explore one undersea world in Central America, and create another in the National Museum of Natural History



Flanked by drifting collection bags, Porter Kier examines the life forms on a coral outcropping.

The afternoon sun is dipping low over the Caribbean as Porter Kier, a Smithsonian Institution paleobiologist, topples backward out of the rubber boat into the warm, blue water. With a flurry of fins he heads down to the white sand 20 feet below.

Two other divers follow Kier into the water. One is Mark Hay, a botanist and ecologist; the other is Tony Rath, a college student working for the Smithsonian here at Carrie Bow Cay, a tiny island of sand 15 miles off the coast of Belize, a British dependency in Central America. Accompanied by Kjell Sandved, field photographer and moviemaker for the Smithsonian's Museum of Natural History, the men have come to Belize as part of a long-term project to study the barrier coral reef, the largest in the Western Hemisphere and second only to Australia's Great Barrier Reef.

Their purpose is to help assemble the most complete possible description of the reef's ecology and the forces that affect the countless plants, fish and other animals of the reef itself and the lagoon in its lee. I was there, diving with them, to see how scientists approach so complex a system. Other Smithsonian scientists are diving on reefs in Panama, the Bahamas and St. Croix, the Galápagos and the Philippines, Ponape, New Guinea, islands in the Indian Ocean and the Great Barrier Reef itself.

One scientist, Walter Adey, has achieved what had

The very model of a fantasy tropical isle, Carrie Bow Cay is the site of sustained scientific effort.

been thought impossible by assembling a living coral reef in Washington, far from any seawater. That reef (p. 43) is both a display and a scientific laboratory. He now hopes to do the same for the cold-water ecology of Maine.

On this trip to Belize Kier, an authority on the evolution of echinoids, the group of animals which includes sea urchins and sand dollars, is paying one of his many visits to Carrie Bow. Having previously identified and classified the echinoids of the area, Kier is studying the behavior of the strange and spiny animals to understand better their fossil history.

The place where he and his colleagues will spend the next week is an island 300 feet long and 100 feet wide. Its only natural features are some coconut palms and a scattering of grasses. Three small buildings contain sleeping rooms, a laboratory of sorts and a kitchen. Fresh water comes from two cisterns where rainwater is collected and carefully hoarded as it runs off the corrugated metal roofs.

To the west is the mainland, although its mountains are to be seen only dimly through the haze. In every other direction there is water—its colors depending upon what lies beneath. Light blue water has sand below; bright green has turtle grass and other vegetation; dark blue covers a clay bottom or is very deep.

Kier comes to the surface and swims to the rubber boat. He takes from it an underwater motion-picture camera devised by Harold E. Edgerton of the Massachusetts Institute of Technology. Powered by batteries, the contraption is housed in a length of six-inch pipe, its ends sealed by acrylic plastic lenses and the whole thing mounted on a tripod. Carrying the bulky

The author, a former newspaper correspondent and now coordinator of public information for the Smithsonian Institution, is a diving enthusiast.

These brilliant brittle stars normally hide inside sponges and under rubble, venturing out on the reef

only at night. They are close relatives of the more easily observed sea urchins and sand dollars.

camera, Kier swims down to the bottom. He has found a number of sea urchins of a species known as heart urchins because of the distinctive shape of their shells. He places these within range of the camera while Mark Hay brings down the electronic strobe.

In the clear, 80-degree water the two instruments are set up and the electrical connections made. When everything is arranged to Kier's satisfaction, the divers surface and scramble back into the two rubber Zodiacs. Below them, the camera begins to click away, one picture every 30 seconds. Over the next 14 hours, the camera will record the doings of the slow-moving urchins as they burrow into the sand. Kier will use special equipment to analyze each frame and observe how the echinoderm burrows and eats almost anything it may find.

As the divers head back to the cay, the sun setting behind them turns orange, silhouetting the distant mountains of Belize. When darkness falls, the flash of the strobe, every half-minute, is clearly visible from the cay, nearly a quarter-mile away.

After a dinner of baked grouper, fried plantain, red beans and rice—and banana bread washed down with the locally brewed Belikin beer—Kjell Sandved turns to his camera equipment. As the generator outside the building putt-putts away in the tropical night, Sandved begins to assemble a portable aquarium which he says is the lightest ever made. It consists of a hollow aluminum frame, a large plastic bag and a small sheet of Plexiglas through which he can photograph.

How do urchins do what they do?

Kier and Mark Hay fall into conversation about sea urchins. Kier points out that the animal, without eyes and only a vestige of a central nervous system, somehow can locate food—including other species of urchins on which it preys—and that it moves its spines and tube feet in synchronization. Hay is a veteran of some 600 dives off the coasts of Panama, where he spent two years on a fellowship at the Smithsonian's Tropical Research Institute studying the ecology of coral reef algae. He tells of colleagues dropping a ring over a spine of a black urchin, whose brittle but needle-sharp spines can penetrate a sneaker or even a diver's hard rubber fin. Although lacking a discernible brain to organize its actions, the urchin promptly coordinated its spines to lift off the ring and drop it to one side. When the urchin finds a piece of food, its tiny tube feet work together to convey it to the animal's mouth in the middle of its underside. When turned upside down, the tube feet of an urchin or starfish move rapidly back and forth, reminding one of a miniature herd of cattle thundering along.

Kier was for six years the director of the Smithson-

Cooperative living: a queen angelfish moves in closer so the cleaner shrimp can pick it free of parasites.

A decorator crab, *Macrocoeloma trispinosum*, hides from predators by covering itself with living red algae.

ian's National Museum of Natural History, but in 1979 he gave up the job to devote full time to research among his beloved echinoids. Here at Carrie Bow Cay he is intrigued not only with their behavior, but also with why sand dollars and one species of sea urchin have virtually disappeared from the area. Once found in considerable numbers, sand dollars have not been seen here for some years. The same puzzle is posed by the *Clypeaster subdepressus*, a brown-spined urchin whose body is flattened on top with the underside concave (p. 40). Kier also searches for snail parasites that infest sea urchins, drilling holes through the shells with their radulae, rasplike devices, and living off the juices of the animal inside. While a number of local snails drill through the shell and clean out the inside, the true parasite has never been observed here, although it is common in other parts of the Caribbean.

Next morning Porter Kier sets out in the Zodiac to search for sea urchin parasites. To protect his fair skin against the sun, he wears a getup that might scandalize Jacques Cousteau: old brown-and-white seersucker trousers, green socks, a sickly green polo shirt and a battered tan baseball cap. Reaching a likely site, Kier drops anchor, sheds polo shirt and cap and pulls on an old black wetsuit jacket with holes in the elbows. He struggles into his tank and buoyancy vest, dons fins and mask, topples into 15 feet of water, still wearing the trousers with a diving knife strapped to one leg.

The bottom is covered with turtle grass, a world of silence through which Kier moves slowly. Here and there are patches of sand littered with broken clamshells left by predators. Tiny hatchling fish cluster together in schools like swarms of insects; a few larger fish can be seen, most protectively colored or shaped, allowing them to live in an environment almost devoid of shelter. Tiny white spider crabs scuttle about on the equally white sand. Empty conch shells covered with brown algae, their inhabitants long dead, are a common sight.

A school of small squid, their nearly transparent bodies two to six inches long, drifts slowly by. With their large eyes and their tentacles pulled sharply to a point in front of them, they resemble a flock of mournful-looking birds. From the bottom rises a small shrimp swimming along on business of its own. A squid about four inches long approaches without any perceptible movement. Suddenly there is an explosion of tentacles and the shrimp is seized, held fast. The squid begins its meal.

The sea urchins for which Kier searches are burrowed into the sand or partially hidden in the turtle grass. No sooner has he started examining urchins for parasites than he finds an empty shell of the long-lost *C. subdepressus*. Parasites become secondary, as Kier searches for the missing species. He finds no living specimens, but he does find a large and rare helmet snail, its rounded shell a good 14 inches tall. He turns it over and his shout is clearly audible 15 feet away. The snail has pounced, if that word can be used about an animal that moves two or three feet an hour, on a *Clypeaster rosaceus*, another brown-spined urchin known as the sea biscuit, and is preparing to pierce the shell and devour its soft body. As the snail withdraws into its shell, it continues to hold the urchin.

A box crab, genus *Calappa*, expels a graceful stream of water that has already been passed over its gills.

This clear-bodied shrimp with the eyelike decorations on its tail lives among the sea anemone's tentacles.

Kier carries snail and prey to the surface, places them in a five-gallon bucket of seawater, and returns to the bottom. His search for the elusive *C. subdepressus* continues. But once again his attention is diverted as he spots another, smaller helmet snail and discovers this one is eating a *Lytechinus variegatus*, a small sea urchin with short, greenish-tan spines. The snail has broken an irregular hole in the urchin's shell, sucking out the soft animal inside. Kier has never observed this before and is fascinated that the hole is not the typically round, neat opening usually drilled by such predators of the urchin. Surfacing and returning to the boat, Kier takes his large snail and its sea urchin victim ashore for study. Afterward, he returns the snail to the sea. "I'd love to keep it for the collections," he says, "but they are becoming so rare in this area I just couldn't do it."

Meanwhile, Mark Hay has been collecting algae in the lagoon and has brought back several unusual species to put in a tank of seawater. Algae grows in many forms, from the slippery green films observed on ponds and rocks to the huge brown kelp found in many coastal waters. Hay has found a species of lettucelike algae of the genus *Padina* and he begins to test with a battery-powered light meter the amount of light that can pass through it.

Plants in the genus *Padina* contain calcareous ridges or strips. Hay, who wrote his doctoral dissertation on the ecology of coral reef algae, has observed that, when the sun is directly overhead, as much as 80 to 90 percent of the light passes through the plant but that as the angle of light drops lower, the amount of light absorbed seems to increase dramatically. His tests here confirm his previous work, but he is skeptical and wants to repeat the test in artificial, controlled light. Unfortunately, he discovers that the light from bulbs powered by the gasoline generator fluctuates too much to be used in his work. The tests will have to wait.

The next day Hay and Tony Rath go outside the barrier reef to dive. The reef extends along much of the coast of Belize, with the result that only gentle waves lap against the shore.

The two men drop anchor safely away from the exposed surface of the reef. When they straighten and look down after their backward roll into the water, the panorama of one of the world's few remaining unpolluted, undesecrated reefs stretches away from them. The reef is a jumble of coral: towers, globes, irregular shapes of all kinds, much of it covered with brown algae, but everywhere there are bright patches of color, from the reds, greens, yellows and blues of sponges to the soft purples and violets of sea fans and feathers. The reef is actually several coral ridges, running roughly parallel to one another, built up over thousands of years as the sea level fluctuated, sometimes radically. Between each ridge the sandy bottom is visible, dotted with clumps of coral, rocks, sponges and debris.

As the divers move downward, they see the fish that live closely within the twisted shelter of the coral: angelfish (p. 38), striped in white and yellow or blue; butterfly fish, edged in yellow; chromis, bright, metallic blue. In the dark holes and beneath rocks and coral formations other animals lurk: the moray eel with

Solving the riddles of the reef

Porter Kier holds shell of a sea urchin, *Clypeaster subdepressus,* a species that has vanished from Belize.

viselike jaws and teeth that can penetrate to the bone; the spiny lobster, tasty to eat but tricky to catch, even with gloves. The two men approach crevices and holes cautiously. They swim 200 yards along the ridge, then drop into a sand-bottomed trough, looking for unusual species of algae and echinoids for Kier.

One of the divers finds a flattened shell looking very much like a large sand dollar. The bottom is broken out where some predator, probably a fish, made the hapless resident part of its meal. The shell is placed in a mesh collecting bag and the divers continue, up over a ridge rising some 45 feet from the bottom and on until they come to a drop-off.

Beyond is a deep azure abyss, deeper blue than the sky, plummeting 800 feet down along a cliff of coral. As the divers watch, two large eagle rays, their backs brown with white spots, swim by in formation, their huge wings beating gracefully through the water. They are some four or five feet across and about eight feet long to the ends of their tails. A remora fish hovers above them. Behind them come two more rays, swimming in the same stately fashion, apparently using the edge of the drop-off as a highway. A few moments later, a large green sea turtle flaps by, its head extended, flippers working rhythmically. The turtle disappears from sight and the divers turn and head back to the boat.

Photographic sampler of the reef

On the cay, meanwhile, Sandved has rigged up four tanks which receive water pumped directly from the sea. Dark tarpaulins screen out most of the light. Now Sandved goes collecting. A photographer by profession, he has become an accomplished naturalist over the years. He knows the animals of the sea by name, where they live and how to catch them. There has been an unusually low tide and the shallow area between the cay and the reef is largely exposed. Wearing sneakers, Sandved splashes about happily with a small net, turning over rocks and exclaiming excitedly at what he finds. A small octopus, several fish, two small banded cleaner shrimp (p. 38), a few tiny crabs and then, a great cry from Sandved: he has found a small moray eel.

Next morning, Sandved rigs his lights and settles down to his photography. He watches in fascination as a small crab of the genus *Macrocoeloma* (p. 38) climbs onto a piece of algae and begins to snip off small pieces with its claw, arranging them on its back as camouflage, and he is intrigued when a small sea anemone extends its oral disc for feeding, displaying its red and green flowerlike tentacles. All the while, his camera clicks and whirs and the strobe lights flash in his makeshift studio.

Kier continues his own diving, looking for parasites and for the elusive echinoderms. He finds nothing, but is undaunted. One evening, after completing his notes on the day's work, he talks about the coral reef project which originated with him and such Smithsonian scientists as Klaus Ruetzler, curator of the Department of Invertebrate Zoology, who studies coral reef sponges and serves as logistic and scientific coordinator of the study program. The founders also include Ian Macintyre, a geologist whose specialty is coral reefs; Walter Adey, the paleobiologist and coral reef expert who constructed a living coral reef ecosystem, the only one of its kind, in the Natural History Museum; Arthur Dahl, a marine botanist who now is a regional ecological adviser for the South Pacific Commission in New Caledonia. With small sums appropriated by Congress and annual grants from the Exxon Corporation, they have kept the work going, studying, analyzing and publishing scientific papers that would fill three or four volumes.

Light influences coral shapes

Macintyre has conducted extensive studies of the growth patterns of the reef itself. With a former colleague, Richard Graus, he has determined that light intensity influences the growth of coral. One species of coral, *Montastrea annularis,* develops in different shapes according to the decreasing light available at greater depths. At depths down to about 15 feet, the coral colonies, which comprise thousands of tiny animals, are hemispherical in shape; down to 75 feet, they are peaked or column-shaped; and below 75 feet they are flat or platelike. Macintyre also has stained colonies of coral with red dye to determine accurately their rates of growth.

On nearby cays are equally fragile ecosystems: mangrove swamps whose trees, their roots immersed in saltwater, offer shelter to fish, birds, reptiles and mammals. Under Ruetzler's direction, the Smithsonian is undertaking a study of the mangroves which, when added to the information being gathered at Carrie Bow Cay, will provide a still broader ecological picture of the area.

The first of several volumes of collected papers, representing the major scientific disciplines practiced at Carrie Bow, will be published later this year (by the Smithsonian Institution Press), but Kier hopes that someday a single scientist will assess all that has been written and prepare a single, comprehensive document giving a full picture of the reef, its many forms of life, its geology, its morphology and its significance to the sea and to Man.

Across the reef itself, to the north and east of Carrie Bow Cay, the scientists have plotted a transect line

A clear and present danger to divers, the *Diadema antillarum* is most common sea urchin in Caribbean.

A grazer of algae, *Tripneustes ventricosus,* covers itself with blades of turtle grass as camouflage.

Eucidaris tribuloides, which is much like the urchins of 100 million years ago, looks like a naval mine.

Solving the riddles of the reef

marked by buoys. Every form of life along this line, extending for 250 yards inside the lagoon and for 340 yards across the reef, was carefully inventoried and recorded. Periodically the inventory is painstakingly repeated to record the changes which have occurred and to expand the understanding of this most complicated and fragile of ecological systems.

But the work in Belize is only one facet of the Smithsonian's reef research. A thousand miles east of Carrie Bow, Walter Adey peers down into the clear water of the barrier reef of St. Croix. He removes the battered hat he has worn longer than anyone can remember, dons his mask, tank and fins and drops over the side of a Zodiac. At anchor nearby bobs a white-and-blue Grumman Albatross seaplane and, just beyond that, a 100-foot converted tuna boat.

This stocky, ruddy-complexioned Bostonian—like Kier, he must avoid prolonged exposure to the tropical sun—is prowling along the reef to continue his work on what can truly be called a breakthrough: he and his colleagues at the Museum of Natural History have learned how to keep alive in captivity a small but complete coral reef with its myriad plants and animals, an accomplishment that until a few years ago was regarded as impossible.

Last October Adey's reef, with more than 300 species of animal, fish and plant life, went on public exhibit at the museum in a 3,000-gallon aquarium. Here, visitors may keep their feet dry while seeing a complete and virtually self-sustaining biological system at work far from its native habitat. A coral reef must maintain a delicate biological and chemical balance. If oxygen, nitrogen or carbon dioxide levels in the water are not within certain tolerances, the results can be catastrophic. Reduced oxygen levels can kill much of the animal and fish life; too much nitrogen can trigger wild algae growth, smothering the coral. The same balances exist between coral and algae and many of the fish and animals. Some species of rapid-growing algae are kept in check by fish and crustaceans that graze upon them. Other animals and fish prey upon these grazers. A sharp decline in the grazers would trigger a decline in species of predators and, simultaneously, permit the unchecked growth of certain species of algae, covering the reef and choking other forms of life. A drop in the number of predators would allow the grazers to consume much of the algae, thereby destroying shelter and breeding space for other fish and animals.

For Adey, the reef project is not to be viewed as an accomplishment in itself so much as the development of a new and important research tool. Now scientists can study reefs under controlled conditions. Work which previously was difficult or impossible to perform in the open sea can be done in a living laboratory. "I'm not interested in reefs just because they are reefs," says Adey, "I'm interested in them as systems and in building microcosms of these systems."

Using the exhibit reef and a prototype built several years ago in the museum basement, Adey and other Smithsonian scientists have been able to conduct studies in a few days that would consume great amounts of time and money in the open sea. Measuring the growth rate of algae and its production of oxygen, for example, work that would take months at a cost of thousands of dollars in the Caribbean can be done in the aquarium much more quickly. Another study, even more difficult to conduct in the sea, is the effect of predators on algae grazers and the subsequent effects on algae growth. In the aquarium, using small refuge tanks linked to the main system, the work can be done quickly and economically. Adey points out that while it is necessary to check results obtained in the tank against the natural reef, the living model provides a more efficient way to develop scientific hypotheses and work out research techniques.

Artificial waves, artificial sun

The tank holding the exhibit reef is six feet tall, 12 feet long and four feet wide. Waves surge across it because Adey has discovered that wave action is necessary to reef life, particularly increasing exchange of biological wastes and carbon dioxide while circulating oxygen and nutrients with attached organisms. His surf is provided by two large buckets which fill and dump alternately at intervals, and occasionally simultaneously, to simulate the varying wave frequency. Overhead a tropical "sun," provided by racks of metal lamps, beats down on the reef with an intensity—and a light spectrum—approximating real sunlight. At dusk the lamps go out sequentially, produc-

ing twilight and then darkness, and at dawn they turn on in the same fashion, giving the illusion of sunrise. At night, valves are opened to a connecting tank which, with a sandy bottom covered with turtle grass, serves as a lagoon where some species of fish swim from the reef to feed on arthropods and crustaceans.

The key to the captive reef is a device Adey calls the algae scrubber, a plastic screen with a thick mat of fine algae. Water from the main tank is pumped through the scrubber which, like the reef itself, has intense lighting and a wave-generating device. The algae rapidly remove ammonia and carbon dioxide as well as other compounds and replenish oxygen.

The exhibit reef comprises about four square meters, with the lagoon adding about two meters more. In the mind's eye, one sees the captive reef as free, stretching away into the blue distance, alien and beautiful, teeming with life, one of the most complex ecosystems on Earth. Coral reefs are so productive that the algae production of a mature reef exceeds that of any crop grown on fertilized and irrigated farmland. Adey believes that this productivity can be harnessed to serve a world awash in pollutants and running short of energy.

Since the 1950s the idea of using algae for food and pollution control has often been explored but, while interest in this research field has continued, optimal techniques and the right types of algae had not been found. Adey may have discovered at least some of the necessary answers. If masses of algae turf can filter organic pollutants and excess nitrogen from seawater, they should be able to do the same for water discharged from sewage disposal plants. Adey also envisions algae grown in massive quantities in the open sea and harvested for animal fodder or as fuel to be burned. Huge quantities of algae could be decomposed under controlled conditions and the methane gas given off collected for commercial use.

These possibilities and others have yet to be examined, but the Smithsonian's scientists believe that their basic research on coral reefs may one day help solve some of mankind's most serious problems.

Walter Adey places a piece of coral on the reef now on exhibit—and being used for research—in the Smithsonian's National Museum of Natural History. It is first reef to survive far from tropical waters.

Private Collection

By Robert Wernick

The world inside the magical boxes of Joseph Cornell

In an ordinary house on an ordinary street in Flushing, he built an extraordinary universe out of dreams and odds and ends

Cornell holds encased mock katydid, a tribute to Jacqueline Bisset who was in film, *The Grasshopper.*

When e. e. cummings was asked to admire that marvel of modern engineering, the 80,000-ton superliner *Normandie,* he remarked offhandedly that his great-aunt Effie could have done just as well with a couple of bent hatpins and a thimble. He spoke there with a typically American voice, that of the crafty know-it-all Yankee eccentric, the crusty self-taught loner whittling away at a better mousetrap out by Walden Pond, working out the laws of the universe for himself and giving not a hang for what drummer the mass of his neighbors chooses to march to. There used to be characters of this sort all over small-town America, and most of them were merely eccentrics, figures of fun. But every so often one of these oddballs turned out to be a genuine genius. Emily Dickinson belonged to this breed, hiding behind her hedge in Amherst all her life and twisting the English language to express perceptions of uniquely delicate and cutting imagery.

Joseph Cornell was another. Like Dickinson, he spent most of his life in a single house, this one in Flushing, New York, and there he turned out the intensely private work that is now recognized as an original, if unclassifiable, contribution to American art. A major retrospective exhibition of his work, covering only part of the immense collection he had left squirreled away in his house when he died in 1972, is currently at the Museum of Modern Art in New York (MOMA), where it will be shown through January 20. It will then travel to major museums in England, Germany, Italy and France before returning to conclude at the Art Institute of Chicago a year later. More than 200 constructions and 75 collages are on display at MOMA, but the traveling exhibition will not be as comprehensive, though still the largest representation of Cornell's work to be seen abroad. Everybody should like the show, because it is almost impossible not to like Cornell, though people often find it hard to say why. He dealt in indefinables, and in the long run there is not much more to say about him than that he had a unique gift for placing objects in a way that would delight, mystify, enthrall anyone who bothered to look at them.

He made collages, he made movies, and these have been greatly admired, but his principal work is his boxes, handmade boxes filled with an extraordinary miscellany of objects capable of setting up infinite reverberations in the mind of the viewer. "Hexagons of wood and glass," wrote the Mexican poet Octavio Paz of Cornell's boxes, "scarcely bigger than a shoebox/ with room in them for night and all its lights."

The man himself was stooped, sad-faced, birdlike, insignificant-looking. One of his dealers remembers him slinking into the opening of one of his shows, in a raincoat, "without charisma or a necktie." He did not talk much, and his talk was apt to be punc-

Portrait of this Medici girl was starting point for *Medici Princess,* a kind of dreamy, visual slot machine.

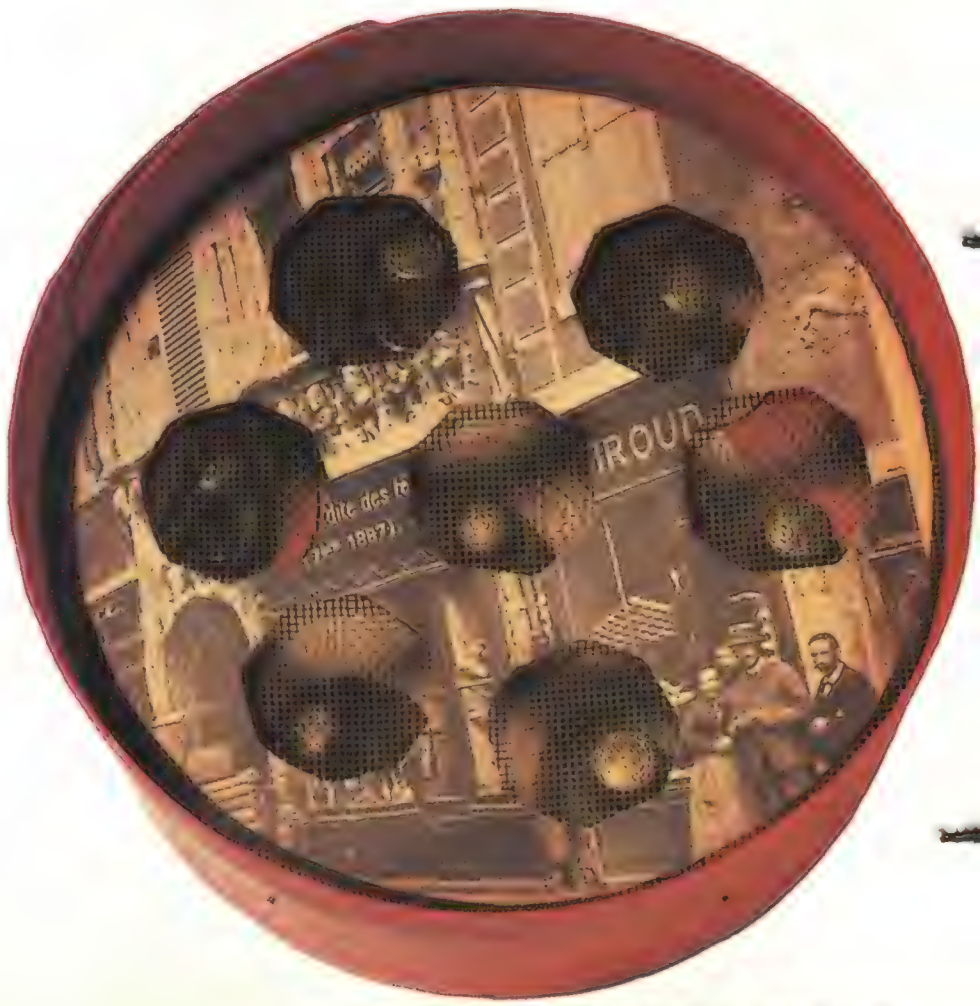
tuated by long silences. He was born in Nyack, New York, in 1903, the sixth and last of a line of Joseph Cornells going back to Dutch Colonial days. He went to Andover, where he ran track and was not remarked about for anything. Between 1921 and 1931 he worked for a wholesale woolen company in Manhattan, but he preferred to spend his time prowling and browsing through the secondhand bookstores on Fourth Avenue, where he began assembling the colossal collection of prints and illustrations snipped from old books that would later fill a good part of his house. That modest, white frame house, where he lived for 43 years, was on Utopia Parkway in the borough of Queens.

He shared the house with his mother and his invalid brother Robert, to whom he devoted years of care; he had to be home every evening to take care of Robert. Robert was partly paralyzed and spoke with difficulty; but Joseph claimed that Robert furnished him with ideas, and his work can be considered a noble toy to light up the sad life of his brother.

After his school days he seldom made any journey farther than the subway ride from Flushing to Times Square. But what need had he to travel when ideas could "explode like novae" in his head, when his imagination could carry him at unpredictable intervals to Italian opera houses of the early 19th century, to discreetly cozy French hotels, to the Milky Way? He never married, but he was surely happier than if he had, in his lifelong passionate and necessarily unrequited love affair with Fanny Cerrito, a Neapolitan ballerina who had danced in the *Pas de Quatre* in 1845 for Queen Victoria almost 60 years before he was born.

Though no one shared his privacy, he was by no means a recluse. He had a constantly growing circle of admirers, and he might occasionally summon one of these to his house to see some of his work or simply to share a chocolate roll or a mocha cake—for he had a remarkable sweet tooth. And there were enthusiastic young people proud to be able to help him build his boxes in his basement workshop and keep his voluminous correspondence in some kind of order. But he was not made for close personal relationships outside his immediate family. He got on with people only when they were on his private wavelength, and when they were not he might drop them abruptly. One side of him preferred, like the 19th-century Romantic poets whom he greatly admired, to reserve his deepest emotions for distant, unattainable figures—dream figures—all the more attractive if they were connected with the stage.

Vast spaces and unlimited range of dreamworld imagination are contained in Cornell's little boxes.



A collector of Shaker boxes, Cornell made a series of Beehive or Thimble Forest variations, this in 1934.

Museum of Modern Art, gift of James Thrall Soby

Collection of Francoise and Harvey Rambach, New York

This one, depicting Cornell's love of sea and heavens, is 12⅛ by 17 by 3⅝ inches overall.

Collection of Mr. and Mrs. E. A. Bergman, Chicago

Once, it is said, the police became interested in the way he was circling and fluttering around the ticket booth of a theater near Times Square. The cashier inside was blonde and gorgeous, and there was the added attraction that she spent all day in an Art Deco box. But it is unlikely that Cornell would ever have dreamed of laying a finger on her, any more than he did on the dozen or so Hollywood stars with whom he carried on one-way epistolary romances. He was more than half in love with Hedy Lamarr, in whom he found a "gracious humility and spirituality," with Marilyn Monroe, with many others. He kept complete dossiers on scores of stars and often wrote them wistful letters, sometimes with cutout decorations pasted to them. He had an encyclopedic knowledge of the life histories of these stars, and a chance association might set off a flow of memory. Once he was asked by an interviewer—this was the kind of question he loved—if he liked cherry soda. His reply: "In a very mystical way. They have them in the underground in those big conveying machines—it brings back memories . . . cherry and lime also remind me of Sheree North—a starlet they were going to build up to Marilyn Monroe roles, but it didn't happen. I sent her a small box once, but never heard from her."

Once a dealer called him up to say that Tony Curtis, an admirer and collector, wanted to visit him with his wife. "I have a dossier on Tony Curtis," said Cornell delightedly, "and an even bigger one on Janet Leigh." This dealer was a little embarrassed, with Curtis at his side, to explain that Mrs. Curtis was no longer Janet Leigh but Christine Kaufmann. He need not have worried; it turned out that Cornell had a Christine Kaufmann dossier as well.

He was delighted by all kinds of strange chances and coincidences, as when he learned from an article in *Mademoiselle* that Jean-Paul Belmondo, one of his favorite actors, was a collateral descendant of Fanny Cerrito (or "Miss Cherry-toes," as he sometimes called her), his great hopeless love.

This kind of unexpected coincidence, full of deep but undefined significance, was at the heart of what Cornell was looking for all his life and in all his art. He believed with his Romantic forebears, like the French poet Gérard de Nerval (who, too, was consumed with a hopeless love for an actress), that the proper domain of art was "an overflowing of dream into waking life."

For Cornell, as for Nerval, the aim of the artist was consciously to find this same mixture of strangeness

A peephole in side gives the viewer a spectacle of multiple thimble images, reflected in circular mirror.

Portrait of dancer Fanny Cerrito, about 1855-60. She was the girl of Cornell's most romantic dreams.

He even had boxes marked "flotsam" and "jetsam" in his studio on Utopia Parkway. A well-organized

and inevitability. They did not so much want to imitate or to re-create dreams as to connect with them.

Easier said than done. Generations of poets and painters and composers have tried to communicate the feel, the atmosphere of dreams, but the result has generally been obscurity or incoherence or dullness, or all three. Cornell's immediate masters were the surrealists; it was surrealist artists like Max Ernst (SMITHSONIAN, March 1975) who helped inspire him to assemble disparate fragments of images in the high-toned parlor game they called collage.

This was not his true way, however, and he soon outgrew it. He shared the surrealists' fascination with the dreamworld that opens up to us every time we go to sleep, but he understood it better and more humanely than they did. Most dreams, fortunately for us, are not nightmares, and the word "dreamlike" does not ordinarily connote hostility and terror; it evokes a certain gentleness, a certain sense of wonder. This was the world Cornell spent his life exploring.

A Cornell box is never very big; the largest recorded dimensions are about 24 inches by 18 by 6. He worked very carefully on their construction, carpentering them with precision, covering them with several coats of stains or paints, then sometimes baking them in ovens and otherwise conditioning them to give a weathered look of indeterminate nostalgic age. And he packed them with nostalgia, with items out of a past he had made his own, with bird feathers and stuffed birds, astronomical charts, reproductions of Renaissance portraits of melancholy boys, clay pipes that recalled his Dutch ancestry, mirrors, glass vials, clock springs, bits of cloth, grains of sand, shells.

As in all dreams, the raw material came out of his daily life, which was quite unlike most of ours. It was spent in deliberately collecting impressions—out of books, pictures, chance meetings, chance sights—bits and pieces of reality that he would later reassemble in his constructions. He saved everything he laid his hands on, and he kept it in a great jumble of a filing system that overflowed most of the rooms of his house. A photograph of a corner of his workshop (above) shows shelves piled helter-skelter with shoe boxes labeled Plastic Shells, Sea Shells, Springs, Watch Parts, Rings, Glasses, Dürer, Tinfoil, Tinted cordial glasses, Nostalgia of the Sea, Love Letters, Jennifer Jones,

place, it was not unlike a construction of the artist, which in its way, of course, it was.

Owls, Medici Slot Machine mat, Strings and Flotsam.

Howard Hussey, one of his assistants, jotted down one day the labels on a series of folders piled on bookcases: Landscapes, Cloudscapes, Faces of the Young, Debutants (sic), Bird Portraits, City Exteriors, Jeanne Eagels, Malibran, Debussy.

Hussey was riding with him on the bus one day on the way to deposit some checks in the bank when he noticed that Cornell was not paying any attention to what he was saying. Cornell was transfixed by a sudden wonder, put on presumably for his sole benefit: a lustrously pink cloud alone in the sky, fading imperceptibly into the blue immensity over LaGuardia airport. Such moments were to find their way through crooked channels into his boxes and collages.

What they meant precisely when they got there was something on which Cornell would, and probably could, shed no light.

The boxes may be mysterious, but they are not necessarily obscure. Sometimes it is easy to trace their connection with obsessive interests. Thus, he was fascinated with the career of the early 19th-century opera singer Maria Malibran, and several of his collages and

Museum of Modern Art, gift of James Thrall Soby

Taglioni's Jewel Casket is an evocation of one aspect of the life of the great ballerina Maria Taglioni.

boxes are in his unique way a kind of memorial to her.

Or the box can be a memorial to a whole age, as the hinged wooden one (above) with a velvet covered lid bearing a photograph of the legendary ballerina Taglioni and an inscription that reads: "On a moonlight night in the winter of 1835 the carriage of [Maria] Taglioni was halted by a Russian highwayman, and that enchanting creature [was] commanded to dance for this audience of one upon a panther's skin spread over the snow beneath the stars. From this actuality arose the legend that to keep alive the memory of this adventure so precious to her Taglioni formed the habit of placing a piece of artificial ice in her jewel casket or dressing table where, melting among the sparkling stones, there was evoked a hint of the atmosphere of the starlit heavens over the ice-covered landscape." A poetic description, to be sure.

The layered chest is sealed with glass, lined with velvet, and contains two necklaces, glass cubes and bits

Robert Wernick, an American living in France, writes frequently about cultural subjects, most recently on French village of Conques and its saint, October 1980.

of tulle. In little more than a nutshell, you have all the passion and pathos, the cockeyed gallantry and the glorious absurdity of the 19th-century Romantics, those moths desiring a star.

A Cornell box can be quite lighthearted. Witness *A Pantry Ballet (for Jacques Offenbach)* in which the composer of the cancan melodies of *Orpheus in the Underworld* is celebrated by a lobster quadrille inspired by Alice in Wonderland: plastic lobsters with bead necklaces and tulle skirts hanging from strings beneath a miscellany of spoons and forks. More often it is distant, muted, melancholy. The Renaissance boys, the glass cubes, the charts of the stars, all hint at something distant and a little sad. Like any dreamer, Cornell could shift his moods unpredictably. He was not bound by ordinary canons of good taste. Admirers who thought that the engravings he cut out of Victorian books were delightful thought otherwise when he cut pictures of nudes from photography magazines as well. Highbrow visitors to Utopia Parkway were displeased to see a garish tablecloth showing a calypso dance and bearing the greeting: "Welcome to Jamaica."

In some respects Cornell was well read, a very learned man, but he was not an intellectual. He loved dancing at the fringes of the New York art world; he was an artist's artist, a figure to be watched and puzzled over, but he seldom called himself an artist. "On voter registration," he once said, "I call myself a designer." In answer to a biographical inquiry, he summed up his education as follows:

Went to Andover
No Art instruction
Natural talent

He had no false modesty about the talent, however. He knew how good he was and he appreciated recognition if it came in on the proper wavelengths. He had a shrewd sense of the commercial value of his work—he saw the value of his boxes go up from $15 to $10,000 in his lifetime—but he preferred to give them away to someone who had struck the right chord of recognition.

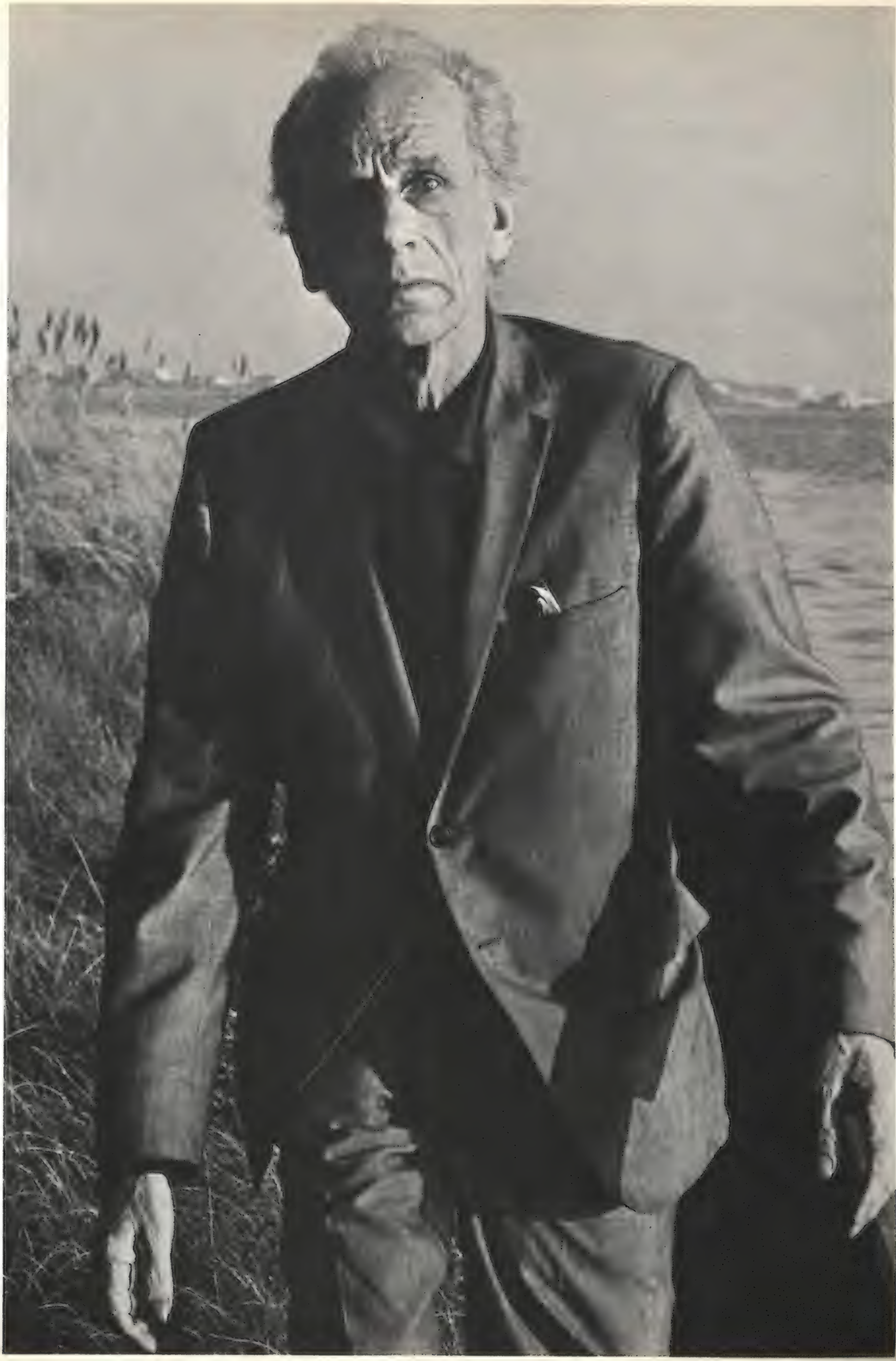
There is a Joseph Cornell Study Center in the Smithsonian's National Museum of American Art, established to further the understanding of his work and his place in art and to preserve an important family bequest of his early objects, collages and textile designs. Most of the collection consists of the artist's source and working material from his house and studio—photographs, books and assorted objects like cordial glasses, clay pipes and posters. A full-time curator, Lynda Hartigan, maintains the collection.

Cornell once described his work as a "serious *plaisanterie*." It has been the subject of some very heavy philosophical commentary, and Cornell boxes are prominently displayed these days in the halls of museums. But as most of his collectors have found, they belong rather in a lived-in living room, placed more or less haphazardly on table or shelf, not to be stared at or studied under a magnifying glass, but to be glanced at sideways at unscheduled moments, to spread a little of the light of other days on the bleak present, to remind us—another cummings quote—that there is another world next door that is a lot more fun than this one.

National Gallery of Canada, Ottawa

Cornell was much taken with birds. Parrot, in *Hotel Eden*, above, is a lithograph mounted on wood.

Nervous edge of his art is apparent in the man as photographed in Westhampton, Long Island, 1971.



By Albert Rosenfeld

Teaching the body how to program the brain is Moshe's 'miracle'

An Israeli scientist teaches subtle exercises that appear to help invalids, athletes and everyone else to function at a higher level

The little boy enters, his mother at his side. Seemingly unfazed by the audience turning to watch him, he heads directly toward Moshe Feldenkrais, who is in Toronto to hold a series of workshops. The boy has cerebral palsy. His gait is stiff and ungainly, and he leans for support on a wheeled walker. As he approaches, Feldenkrais points out how the boy's knees rub together; they have been spastically locked into position, and he has not been able to separate them for years. "The doctors want to cut his adductor muscles," says Feldenkrais, in an accent that is part Russian, part British, part Hebrew. (The adductors are the long muscles on the inner sides of the thighs that draw the knees together.)

The boy stops expectantly in front of Feldenkrais, who is sitting on a stool at the foot of a cot. He tells the boy to take off his shoes. "Notice," he says, "that Ephram's heels do not touch the floor."

Ephram lies down on the cot, and Feldenkrais, with his strong hands, begins to touch and manipulate—at first ever so gently, with tiny movements and pressures. The boy begins to relax, though he looks very attentive. "His breathing is getting much easier, you notice," says Feldenkrais. "His eyes are moving to the right as he listens carefully—not to my words, but to the internal language, the messages between the muscles and the brain."

His hands are moving slowly down the boy's distorted body as he talks. He works silently for a while on the feet and legs, in a listening attitude, occasionally nodding or grunting with satisfaction. He is probing sensitively for responses and connections he recognizes from years of experience with hundreds of pupils. (Feldenkrais has only "pupils," never patients. He does not give treatment, only "lessons." He claims to be simply a teacher.)

Soon, working carefully, flexing the boy's legs, Feldenkrais has managed to cross one knee over the other, without forcing or hurting. The boy looks really pleased. "This is the first time he has been able to cross his knees," says Feldenkrais.

He now uncrosses the boy's knees, which remain slightly separated, no longer locked in place. Feldenkrais makes a fist, places it in the new space between the knees. "Now, Ephram," he says. "Please, can you press your knees against my fist." Then: "Come on, you can do better than that! Close your knees on my fist as hard as you can." He keeps it up, and Ephram, no longer relaxed, is now straining mightily with the weak muscles on the inside of his thighs, an unaccus-

Standing at left rear, Moshe Feldenkrais instructs a class at Hampshire College in Massachusetts.

Photographs by Richard Howard

tomed workout. Soon, "listening" carefully with his fist, Feldenkrais is satisfied that the time is right.

"All right, Ephram," he says, "you don't have to close your knees any more. You can open them now." With clear relief, Ephram relaxes, and opens his knees —all the way.

"See how much easier it is to have your knees open? To close them requires work. To keep them open, you don't have to do anything at all." The boy moves his legs in and out, in apparent disbelief, then bursts into a peal of delighted laughter.

When he stands up again, his heels touch the floor. When he leaves, he still needs the walker for support. But his knees no longer rub together.

At 76, Moshe Feldenkrais bears a resemblance to his longtime friend and supporter, the late David Ben-Gurion—the same strong face, the same nearly bald head with its halo of upward-curling white hair, the same short powerful build. What he does, though always difficult to explain in quick and simple terms, is apply principles and exercises that help the body program the brain so that the whole mind-body system benefits. Moreover, his techniques are eminently teachable, and he does teach them—to a long-term core of devoted students in Tel Aviv, where he now lives; at workshops all over the world; and in the United States, principally in San Francisco, where he spent several consecutive summers training a cadre of pupils, who have fanned out across the country to be teachers themselves. Most are associated with the Feldenkrais Guild in San Francisco.

This year he started a new series of nine-week professional training programs scheduled to go on for the next two, possibly three, summers at Hampshire College in Amherst, Massachusetts, with more than 200 eager new students from an astonishing diversity of backgrounds as well as many of the old graduates who feel they have much more to learn. One visitor at Amherst was Julius Erving—"Dr. J." of basketball fame—who was impressed enough to plan some private Feldenkrais lessons of his own. Another was Jack Heggie, who has put together a booklet called *Improve Your Skiing*, based on Feldenkrais training techniques.

Other pupils and admirers have included violinist Yehudi Menuhin, director Peter Brook, neuropsychologist Karl Pribram, the late anthropologist Margaret Mead and David Ben-Gurion. (When journalist Charles Fox questioned him about famous people, Feldenkrais scoffed at a "social registry," saying "nothing is more important to me than the work I am doing. It is the work that deserves what space you have.")

Albert Rosenfeld, who has won many major science-writing awards, last wrote for SMITHSONIAN *on sociobiology in the September 1980 issue.*

Feldenkrais works with Helena Carleton, who has mild cerebral palsy, to make her aware of contraction

in calf muscle. Since her lessons, her mother says, Helena now "sees her body as something she can heal."

Above: moving her head, he has put Helena's arms on his for support, "to make her feel safe."

Left: Feldenkrais supports Helena's back with one hand while he gently moves her head with the other.

Feldenkrais is not an M.D. Before he became, almost by inadvertence, a mind-body guru—embraced by the holistic-health, humanistic-psychology and New Age movements—he was an engineer with degrees in both mechanical and electrical engineering as well as a physicist. He got his science doctorate at the Sorbonne, studied with Frédéric Joliot-Curie, and worked on the French atomic-research program as well as the British antisubmarine program. While cultivating his mind, Feldenkrais had always been interested in the body's mechanics. Among his other activities, he excelled as a judo master and soccer player. In fact, it was the flaring-up of an old soccer-inflicted knee injury that first led him to apply his engineering mind to the mechanics of body and brain—a task that soon became his absorbing preoccupation.

"In Israel now," says Avram Baniel, a professor of industrial chemistry at the Hebrew University in Jerusalem, "I consider him a national treasure." Baniel, who has been a long-time Feldenkrais-watcher, says, "If I have ever met a genius in the flesh, it is Moshe Feldenkrais."

This genius rating is enthusiastically seconded by Robert Masters, codirector with his wife, Jean Houston, of the Foundation for Mind Research in Pomona, New York. Masters has been for years both a student and teacher of many of the world's body-mind systems, ancient and modern, Oriental and Occidental, from F. M. Alexander to Zen. "Feldenkrais is the man who has gone further than anyone else, past or present," says Masters. "Employing his methods, even I can do some amazing things for people. And the potential applications of it have scarcely begun to be realized—they are clearly useful throughout life, from early childhood to advanced old age."

Learning to walk with grace

The first time I met Moshe in his cramped New York hotel room, he was giving a lesson to Sarah Rosinsky, a young woman with cerebral palsy whom he had "taught" previously in San Francisco. When she heard he was back in the country, but not coming West this time, she had flown in to have a few sessions. Moshe, she related months later, had not only taught her to talk and breathe more freely but also to walk with grace and balance, something which helped her go through a pregnancy in comfort and without falling. "Before I saw him, I had perpetual scabs on my knees," she said.

Journalist Fox, whose own movements were affected by multiple sclerosis, wrote that after only one session with Feldenkrais "there was a very peculiar rush of sensation from feet to brain. Intuitively, I sensed that this was a transmission of vital information."

Teaching the body to stimulate the mind

In cases like these and hundreds more—including the one he writes about in his slender, fascinating book, *The Case of Nora*—Moshe's ministrations are often perceived as therapy, as healing. But Moshe protests: "I don't know much about diseases—only what's necessary to understand them in my terms. If someone says to me, 'I have a disease, I have cerebral palsy, I have multiple sclerosis, I have osteogenesis imperfecta' —I know what these mean only in terms of body activity. I don't need to know anything about 'cures' either. I do know that a disease given a name, especially if it is also labeled 'incurable,' can have self-fulfilling effects. I also know that if a person is having troubles with his movements, I can probably improve the movements, and thereby improve his health and well-being.

"And you know what?" he adds, lifting his eyebrows in mock surprise. "When a person is healthy, it turns out that he is not ill!"

Student tries unaccustomed movements, using rarely utilized muscles to stimulate the brain.

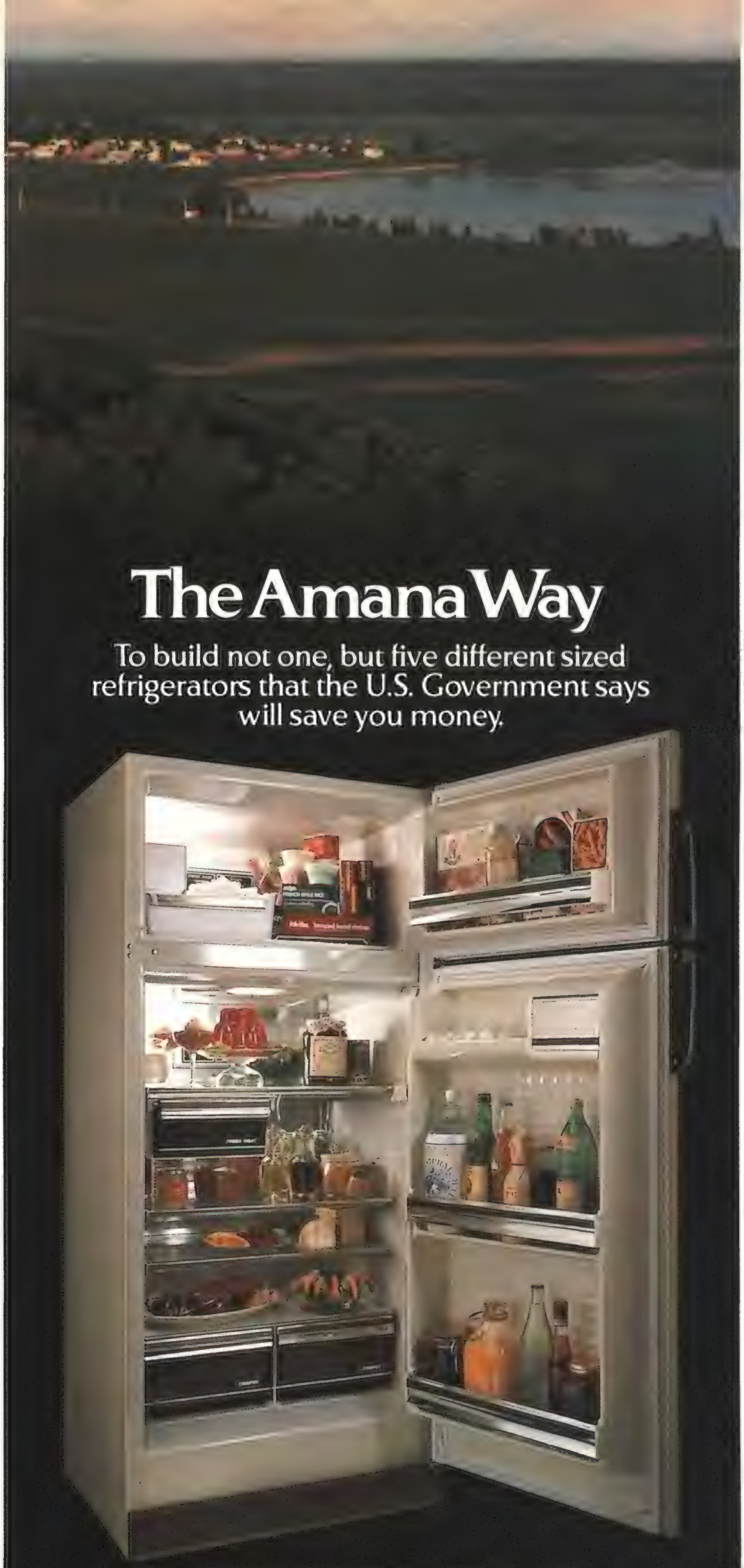
Improvements—these "routine miracles," as one of Feldenkrais' followers has called them—are usually brought about on a one-to-one basis through what Feldenkrais terms "Functional Integration" (variations on the techniques he used with the boy Ephram in Toronto, usually with the teacher actually manipulating the pupil's movements). The other aspect of Moshe's work he calls "Awareness Through Movement," usually carried out through group workshops. These are more like conventional exercises in format, with the teacher guiding the class with words rather than by personal manipulation. Awareness Through Movement—which is also the title of Moshe's most popular and accessible book—is of special interest to professionals who want to fine-hone their skills—dancers and musicians, for instance; but it is intended for everyone, for people who want to improve their awareness, their physical *and* mental performance.

We are all brain-damaged

Moshe doesn't like to emphasize the separateness of Functional Integration and Awareness Through Movement, other than as convenient labels for doing essentially the same thing in different ways. "I especially don't like it," says Moshe, "if the distinction is made that one is for 'sick' or 'brain-damaged' people, and the other is for 'normal, healthy' people. Which of us, after all, is not brain-damaged, in the sense that we allow many areas of our brains to atrophy through misuse or nonuse? We settle for so little! As long as we can get by, we let it go at that. We can have terrible posture and movement patterns and habits which are distorting and damaging to our bodies *and* brains—and still be classified as 'normal.' Most of us use perhaps five percent of body-brain potential. Who are we, then, to call other people brain-damaged simply because their particular deficiency produces visible effects that we label 'disease'?"

I remember the first Feldenkrais exercise I tried. Jean Houston told me to lie on my back (many Feldenkrais lessons are done this way to relieve the body of the antigravity efforts it routinely exerts in the standing position) and go through quite a repertory of very tiny movements, all on the right side of my body, from head to toe. As one example, with my hand stretched over my head, I was to lift the hand barely off the floor, then back, then up again, then back. Tiny motions are not necessarily easy motions, especially when repeated 20 or 30 times, because we are not used to making tiny muscular movements voluntarily.

At the end of that first lesson, having pretty thoroughly worked on my right side, and not at all on my left side, Jean told me to stand up. "Does the right side feel any different now?" she asked.



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"I guess it does, somehow," I said, trying to find words to clothe vague sensations.

"It ought to," said Jean. "You look like a Picasso!"

I went to the mirror. Jean had exaggerated, of course, but there was a noticeable difference. My right eye seemed somewhat larger. The muscles on the right side of my face seemed more relaxed. My right shoulder looked lower than my left.

Vivid use of the imagination is an important part of the Feldenkrais method. I remember doing what seemed at the time a silly exercise. I was sprawled on the ground, face down, with arms and legs spread-eagled. I was told to imagine that I had a continuous groove running all the way from the tip of my left hand, down my arm, then running from my left shoulder diagonally across my back down to my right buttock, then down my right leg to the heel. (Later, the imaginary groove ran from my right hand to my left heel.) Then I was asked to imagine a tiny steel ball that I was to propel along the entire length of the groove, through the use of whatever muscles I wished —only I was not to get up or to move my arms or legs from the spread-eagle position. I can tell you that, in concentrating on this activity, I underwent a lot of unfamiliar sensations and exercised a host of tiny muscles I didn't even know I had. And that is part of the Feldenkrais idea:

The motor cortex has many connections and nerve cells that are directly related to specific muscles that produce specific movements. If the muscle patterns never change—and enormous numbers of them never do, especially after childhood (this is true even of professional athletes)—then those areas of the brain remain in fixed patterns. The more completely you utilize your entire muscular apparatus, says Feldenkrais, and the more aware you are of those movements, the more will the brain be activated—and the activated regions will stimulate adjacent areas. The more parts of the brain that function well, the better the whole brain will function.

Feldenkrais has devised thousands of exercises. One does not, of course, have to do all of them all of the time—only a few at a time as reminders. Some exercises have to be done only once—and the brain-body has learned its lesson. "So smart is the brain, when we permit it," says Moshe, "that even after doing something a million times the wrong way, doing it right even one time feels so good that the brain-body system *recognizes* it immediately as right."

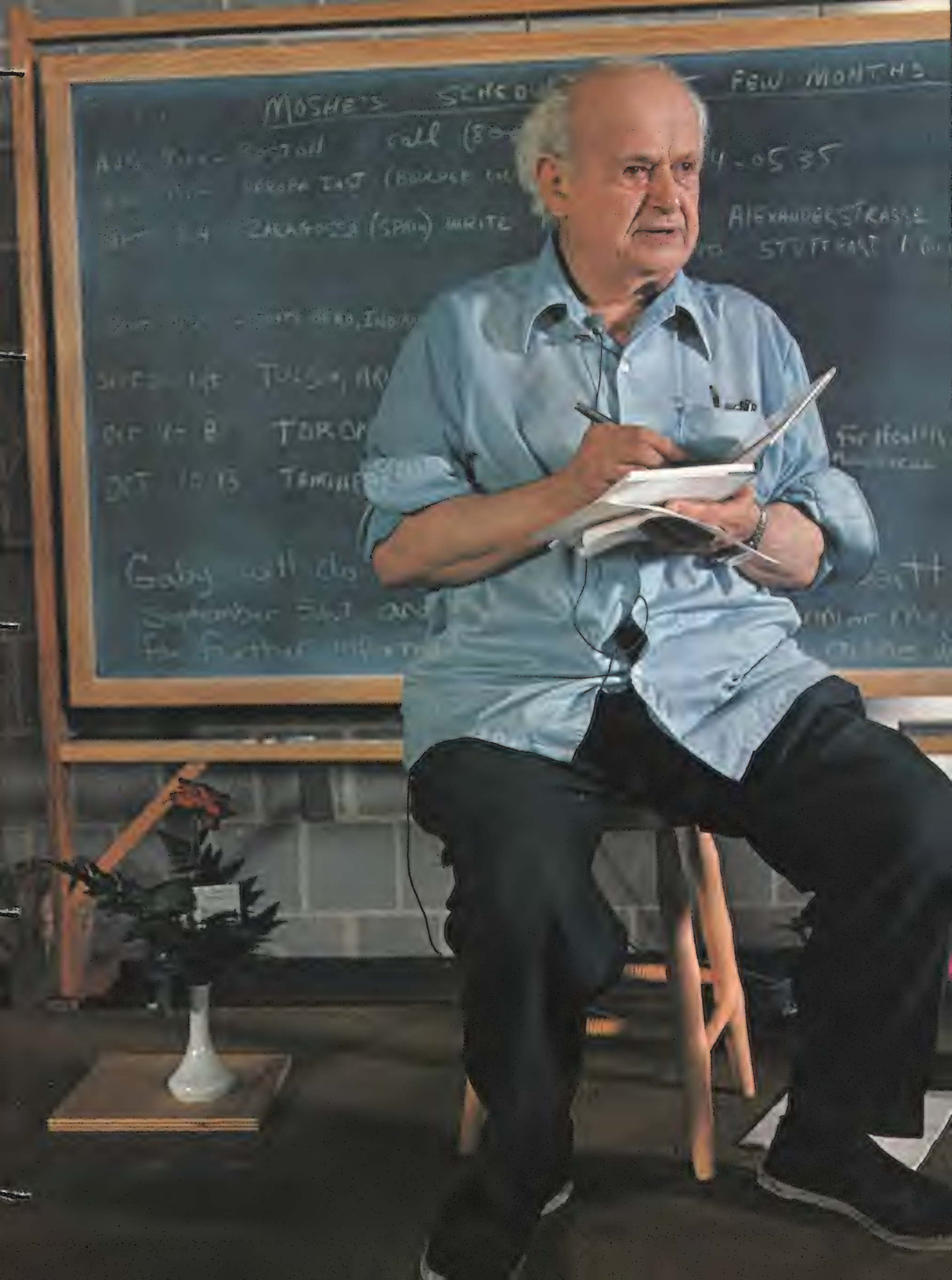
So, in some instances, he wants us to *become* aware of a deficiency or a habit only so that, having substituted a better way, we can forget it. We tend, he says, to be mainly aware of the front and upper parts of our body, very little of the back and lower parts. He would like us to be aware of the entire surface of the body, as well as the joints and skeletal structure. He wants us to be aware that there are muscles constantly holding up our eyelids, holding up our jawbones, against the pull of gravity; that the flexors and extensors of our legs are in constant use (more likely, misuse), keeping us stable in the Earth's gravitational field. By being aware, he holds, we will understand how much unnecessary tension we have, how much pleasure and grace we miss, how inefficiently and stressfully we live our lives.

In sum, we can, with the conscious brain, instruct the body to move in ways that will in turn instruct the brain to permit the body (and hence itself) to function at a level much closer to its full human potential. Through awareness, he believes, we can learn to move with astonishing lightness and freedom—at almost any age—and thereby improve our living circumstances not only physically (he says we may even find ourselves an inch or two taller!) but also emotionally, intellectually and spiritually.

Moshe would like to devote his remaining years and energies to consolidating his theories, to teaching more teachers, to completing the additional books he feels are necessary to round out his work. "Even without any further contributions to our knowledge, however," says Jerry Karzen of San Francisco, an epidemiologist turned Feldenkrais teacher, "Moshe already represents a revolution in human health. *He* may not call what we do therapy, but if it makes people better, what we call it doesn't matter."

At a two-day workshop, the teacher autographs copies of his books for some of his students.

At 76, Feldenkrais travels much of the year to teach, but most people know him through his books.


MOSHE'S
FEW MONTHS
4-0535
ALEXANDERSTRASSE

The amazing story

It was made in England in the eighteenth century and it cracked the very first time it was rung on these shores. Yet for America's soldiers and citizens, it has remained an enduring symbol of Liberty and Freedom in the new republic. Read on about our Liberty Bell and about the rather shrewd investment that a number of twentieth century Americans have been making in authentic, scaled-down replicas of it.

In 1751, the Province of Pennsylvania had a policy of individual freedom that much influenced the other colonies. It was fitting that when the Assembly of the Province decided to order a bell, they insisted that on the bell's shoulder be inscribed the biblical phrase from Leviticus XXV. 10 "*Proclaim liberty throughout all the land unto all the inhabitants thereof.*" The bell was to commemorate the 50th Anniversary of William Penn's Charter of Privileges which ensured freedom for all citizens of the Province.

Isaac Norris, Trustee of the State House (now Independence Hall) was instructed by the Provincial Assembly to order a bell from England. He chose Thomas Lester's Whitechapel Foundry in London to cast the bell and, in September 1752, it arrived in America. Philadelphians gathered in the State House yard to hear it ring out. It cracked, however, upon the first strike, due to mishandling by amateur colonial bell-hangers, eager to hear it. In 400 years, it was to be the only bell from Whitechapel to have so cracked. "Two ingenious workmen," John Pass and John Stow recast it, but Norris did not like its tone and had it recast a second time. It was then hung in the State House tower; and for the next twenty-five years, it would ring out on the burning issues of the day. It loudly proclaimed the coronation of George II but was muffled as it sadly tolled the "death of liberty" when the Stamp Act was enforced in 1765.

THE BIRTH OF A NATION

When the people of Philadelphia received tidings of the Battle of Lexington on April 25, 1775, the bell called together over 8,000 patriots (by actual computation), who assembled in the State House yard and agreed, unanimously, "*to associate for the purpose of defending with arms, our lives, liberty, and property against all attempts to deprive us of them.*"

The supreme effort of the bell to proclaim liberty was next in order. The historic second session of the Continental Congress was already underway, and the final break with Great Britain only a matter of weeks, perhaps days. A special committee was appointed to draft a formal statement, which was then revised by Thomas Jefferson into the form of a "declaration" which was adopted on July 4. Then, on July 8, 1776, the bell rang to summon the patriots for the first public reading of this formal *Declaration of Independence,* which had been adopted four days earlier by the Continental Congress. The bell was now part of American history. The birth of an Independent Republic, the seed of a world power was an accomplished fact. The old State House Bell, as it was then called, was now to "*Proclaim liberty throughout all the land unto all the inhabitants thereof,*" to ring out independence, to have its sequel taken up in every town and hamlet, to set in motion a never-ceasing force against tyranny and oppression.

In 1777, when a British army threatened to occupy Philadelphia, the Bell was dramatically spirited away and hidden in nearby Allentown. After it was returned to Philadelphia, it pealed forth great news on October 19, 1781, ringing out — loud and clear — proclaiming the surrender of Cornwallis at Yorktown. By then, it had been reinstalled in the State House Tower where it continued to ring on many special occasions until it cracked again permanently in 1835. It has been cautiously rung many times since with a rubber mallet. In 1944, on D-Day, its muffled sound was broadcast over network radio. Its most recent ringing, which touched the hearts of Americans everywhere, occurred exactly at noontime on July 4, 1976, during the celebration of America's "Bicentennial Day." Six small school children, all of whom are descendants of signers of the Declaration of Independence, lightly tapped the bell, in unison, in a thrilling, symbolic gesture. This exciting ceremony was witnessed via nationwide television and heard on radio by many millions of cheering Americans in every city, town, and village throughout the nation. Perhaps you remember the wonderful spirit that prevailed on that day.

IN COMMEMORATION

In the spring of 1976, in friendly recognition of America's 200 years of independence, the people of Great Britain sent a birthday gift to the people of the United States. It was a new bell, weighing 12,500 pounds, inscribed with the words "*Let Freedom Ring.*" Then, on July 6th, Queen Elizabeth II of Great Britain came to America to dedicate this superb gift, and the bell now hangs majestically in a special, new tower at the Visitors Center at Independence National Historic Park. On the day it was dedicated; then President Ford officially declared it to be our "National Ceremonial Bell," and it has been gloriously ringing every day since then — on a regular schedule at 11:00 A.M. and 3:00 P.M. Its booming, resonant sound has also been heard on a number of special occasions and on all national holidays. This gift bell was also cast by the Whitechapel Bell Foundry in London at the very same site where our first Liberty Bell was cast in 1752.

To further commemorate the six-year "Bicentennial Era" of the American Revolution (April 18, 1975 to October 19, 1981), the same, famous Whitechapel Bell Foundry has been casting a very limited number of full-size Bicentennial Liberty Bells to the original design and at the original site. These large, 2,000 pound, full-scale replicas have been purchased by a variety of non-profit organizations that have placed them on exhibit in a number of communities across the nation, where they have been ringing out — "loud and clear" — on many special occasions.

In addition to the large, full-size bells, Whitechapel has been casting a special Bicentennial Era, "Limited Collectors Edition" of 2,400 reduced, one-fifth scale replicas (at the rate of about 300 a year) utilizing a special art-metal process. Less than 200 of these smaller replicas now remain to be cast before America's Bicentennial Era celebrations come to a close on October 19th of this year. This particular day — so important in America's history — has been declared by a Joint Resolution of Congress as a "Day of National Celebration" to mark the 200th Anniversary of the American victory at Yorktown, Virginia. There are now plans underway to have all of the owners of Liberty Bell Replicas ring their bells on that day — at a pre-arranged time — to celebrate this important event.

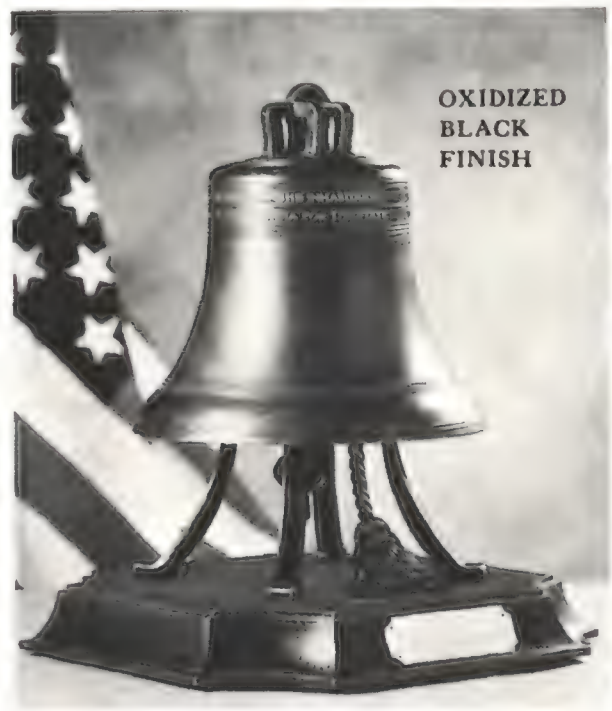
OFFICIAL SANCTION

This worthwhile project — to cast 2,400 scaled-down Commemorative Liberty Bell Replicas — has been given the recognition, sanction, and endorsement of many state and local organizations and official government agencies. And, each has been designated as an "Officially Recognized Commemorative" by the Federal ARBA, the agency established by Act of Congress (under Public Law 93-179) to facilitate and coordinate the events and activities in commemoration of the 200th Anniversary of our nation, and every purchaser of one of these bells is issued an owner's "Certificate of Authenticity" which bears the official symbol of this Federal agency.

Hundreds of private collector-investors, plus many veterans groups, patriotic organizations, service clubs, local chambers of commerce, colleges, banks, and businesses, have already invested in the ownership of one of the limited number of these smaller replicas. They have used them frequently during various Bicentennial celebrations that have already occurred, and they will continue to use them for additional Bicentennial celebrations until they are officially ended on October 19, 1981. They will then retain them for their growing collector value thereafter. Already, the value of the earliest cast bells has increased significantly. In fact, the "melt" value of these earlier bells now exceeds the original amount paid by collectors. When Whitechapel commenced casting these small replicas, the basic black-finished bell sold for $756 as compared to its current price of $1,275. And, the foundry just recently gave notice that, due to further inflation in England, they will again be raising the price in March of 1981, provided there are any bells still remaining to be cast at that time.

The Polished Bronze, Silver and Gold versions of these replicas have also increased significantly in price. The Polished Bronze is now $1,365. Due to the ever-increasing cost of precious metals, the Silver-finished bell currently sells for $1,725, and the Gold-finished bell for $2,250. These prices include duty, special crating, insurance, and overseas shipment to the Port of Boston, USA.

Each one-fifth scale Liberty Bell Replica weighs approximately 20 pounds and stands 15½ inches high on a plinth of hand-carved Oak grown in Windsor Forest. A special, hand-engraved Silver back-plate, made of Old England Sterling Silver,



bearing the owner's name and personal inscription, can be ordered for $5, plus 40¢ a letter, for engraving (owners of Gold Bells receive a Gold Vermeil plate). The Master Founder's plaque, also of Sterling Silver, is mounted on the front side of the plinth and bears the words "*Cast by the Whitechapel Bell Foundry, London, to the Original Design of the Liberty Bell Cast by Them on the Same Site in the Year of Our Lord 1752.*

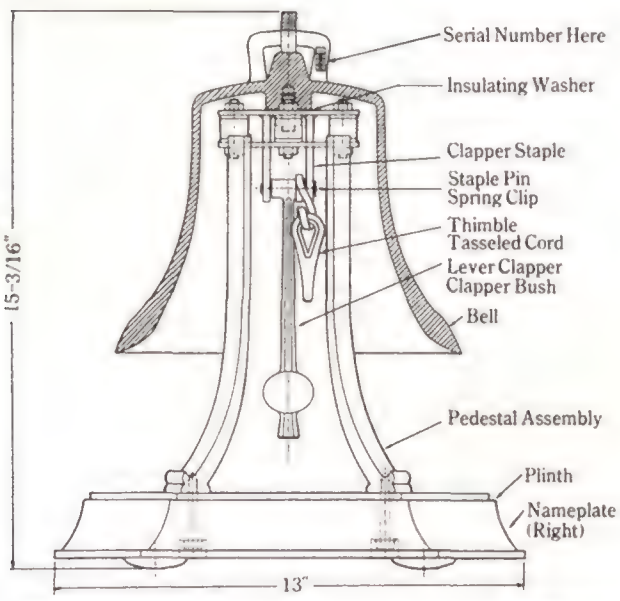
"The Whitechapel Bell Foundry was founded in 1570, and many of its earliest bells are still in existence, including two bells at Westminster Abbey cast in 1583 and 1598. Among the recent bells from Whitechapel are those in our National Cathedral in Washington, D. C., hung in 1964. The famous bell of Big Ben at London's House of Parliament was also cast at Whitechapel, as was the great bell of Bow in London in 1750 and the bells of St. Clement's in 1588, the year of the Spanish Armada. Both are remembered in the old English nursery rhyme, "*Oranges and Lemons.*" The scaled-down replicas are being made in the manner of the original Liberty Bell, embossed with the quotation from Leviticus XXV. 10 in the same type face used by the original bellfounder, Thomas Lester. The clapper, drawn into a hand grip with a tasseled cord, strikes the walls of the bell and causes it to ring a perfectly-tuned note at each stroke. Each bell is being meticulously tuned (actually five partial tones are tuned together) to its final and perfect pitch — E Flat — the same tone as the 1752 bell.

of the Liberty Bell

The replica bells will have no crack! Each will sing its song as magnificently as the original Liberty Bell did when Lester tested it before it left London. In this way, the ancient and historic contract between London and Philadelphia is fulfilled.

HOW TO MAKE A BELL

To make this reproduction possible, the Whitechapel Bell Foundry has incorporated and refined an ancient process which had not been used in bell-making for over 600 years but has been used mainly to reproduce exact detail in fine metallic artwork. This is the Cire Perdu or "lost wax" method of bell-casting, which was recorded most notably in the 12th century by the medieval monk Theophilus in his "De Diversis Artibus," but which was subsequently superseded by the "false bell" method. The principal advantage of the "lost wax" process — and an absolute essential in the making of the Bicentennial Liberty Bell — is the high quality of the resultant castings, particularly where intricate or decorative work is involved. The Liberty Bell has an inscription of 170 separate letters, and this inscription proved disappointing when cast normally at a scaled-down ratio of five to one. To overcome this, and to preserve the clarity of the lettering at reduced size, the Whitechapel Bell Foundry evolved, after two years' research, a process which involved fashioning the primary pattern of the bell not in traditional clay but in wax of medieval bellmakers.



In short, it involves making a complete bell in wax, and then investing, or coating, this in a ceramic material.

PERFECTION OR DOOM

This ceramic material builds up very slowly in outer shell of some ten coats' thickness, using a combination of first aqueous colloidal silica and then calcined china clay. This process, carried out by hand with immense care, is critical to the whole and takes about ten working days. Any error in the application can result in an imperfection, in which all of their exacting work is for naught, for each finished bell must be *perfect* or it is destroyed and consigned to the melting pot.

The invested bell is then placed in a de-waxing furnace, which melts the original pattern, leaving only the ceramic shell — now the master pattern. This is baked at high temperature and provides the final mold from which the actual bell is then cast with molten bell-metal. When the metal has cooled and hardened, the ceramic pattern is smashed away, leaving a magnificent bronze bell.

The casting, and all subsequent stages — such as tuning, polishing, and assembly — are done by conventional, hand-crafting methods, resulting in a bell of the highest authenticity.

MOUNTING

The mounting of the Bicentennial Liberty Bell has been carefully engineered to assure that it will produce a pure resonate tone. No detail has been spared to obtain absolute perfection. The bell is secured by a single center bolt inside its crown to a steel plate to which the jaws of the clapper staple are welded. The forged clapper swings between these jaws on a plated steel pin running in a nylon sleeve to ensure free silent action and perfect mechanical insulation. It is actuated by a silken tassel attached by a solid brass eyelet to a lever which is part of the clapper forging.

To provide the "give" necessary to isolate the bell and clapper from the forged pedestal, the steel crown plate is connected to the pedestal through four special neoprene and rubber vibration mountings. In reducing a bell by scaling it down to one-fifth of its original size, the clapper must be reduced by the same scale to maintain the correct proportion; but while profiles can be scaled, "nature" cannot and the miniature clapper would not bring out the rich tone of the bell. This problem was overcome by introducing into the striking face of the clapper forging a "plug" made from a special type of nylon, which backed up by the weight of the clapper bell, ensures that the bell will sing out — loud and clear.

MADE TO ENDURE

Whitechapel has insured that nothing has been spared in the design and making of the Bicentennial Bells and has fully maintained the ancient traditions of its craft. These bells have been made to *endure*. With proper care, there is no reason why they should not continue to ring for future generations in the tercentary and quadricentary celebrations of these United States.

Each bell is fully and unconditionally guaranteed by the Limited Editions Collectors Society. Should you commission the casting of a bell and you are not totally pleased with it when it arrives, or after you have examined it thoroughly and tested it for its beautiful, resonant tone, you may return it either for an exchange or a full refund — at any time for up to ninety days after it is delivered. The Society will also reimburse you for any shipping costs and insurance charges which you may incur.

The Collectors Society is a private, non-governmental organization, founded by a group of avid collectors, art lovers, and historians, including some who have distinguished themselves in the fields of Arts and Letters. In addition to marketing these unique Whitechapel Liberty Bell Replicas, the Society also issues authentic reproductions and replicas of other historic artifacts, plus exclusive artworks and official commemorative products. It has received a number of important awards for excellence and has been commissioned by a number of non-profit organizations, including the Winston Churchill Foundation, the Freedoms Foundation at Valley Forge, Boston's Old North Church Museum, the U. S. Capitol Historical Society, and the John F. Kennedy Library Fund to create and market their official "Commemoratives" to collectors.

Each item issued by the Society is protected with its Certificate of Authenticity, signed by the chairman of its Board of Trustees. Your Certificate showing the serial number which is engraved on your particular Liberty Bell Replica will be sent to you within thirty days after you have received delivery. Your name and this same serial number is also recorded in the Society's Master Registry of Ownership and its microfilm library. This protects your investment against any possible imitations or counterfeits and also documents the value of your serially-numbered collectible for insurance purposes.

PRUDENT INVESTMENT - RARITY ASSURED

Just 2,400 bells in all are being cast. Each bell symbolically represents a separate month of America's 200 years of independence. WHEN THE LIMITED EDITION IS COMPLETED, THE MASTER MOLD WILL BE DESTROYED, none of these replicas will ever be available again. Only 2,400 Americans will ever have the privilege of owning one. On January 1, 1981, less than 200 bells remained to be cast before America's Bicentennial Era will officially end on October 19, 1981.

Back in July of 1976, the former Administrator of the Federal ARBA, the Honorable John W. Warner of Virginia (now a member of the U. S. Senate) sent a letter of commendation to the Executive Director of the Collectors Society, in which he praised these magnificent replicas as —

"the most significant commemoratives of America's Bicentennial."

Because of this, many of the collectors, who have already purchased these bells, have informed the Society that they will never consider reselling them. Many of them plan to bequeath them either to their children or grandchildren, and many others have already willed them to schools, colleges, or other institutions. As a result, it is doubtful that many of these magnificent commemorative bells will ever appear for resale in the secondary and auction markets. Therefore, the rarity of this outstanding collectible is assured.

GOOD TO GET — GOOD TO GIVE

Of the hundreds of bells already delivered, each has been received with absolute satisfaction. Historical Societies, Foundations, Businesses, Churches, Museums, even Government Agencies, have been, without exception, well pleased. So, too, have the most finicky of private collectors. A number of generous subscribers have ordered the bells for the purpose of donating them to museums and other non-profit organizations. Some subscribers have ordered one for themselves (and their families) and another to donate. Such a gift will be long-remembered.

If you wish to commission the casting of one of the limited number of remaining bells, we suggest that you fill out the coupon below and strongly recommend that you send it at once, along with your deposit. Or, better still, to avoid disappointment, you should call our toll free number — 800-225-5252 — to place a reservation for your bell prior to mailing your Commissioning Order Form.

Remember — once the 2,400th bell is cast, the master mold will be smashed — and none of these Liberty Bell Replicas — *"the most significant commemoratives of America's Bicentennial"* — will ever be available again.

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To: Mr. Douglas Hughes, Master Founder, Whitechapel Bell Foundry, London
I wish to commission the casting of a Liberty Bell Replica in the finish checked at left. I understand that upon completion of my bell I will receive an owner's certificate and will be listed in your Master Founder's directory as the original owner.

☐ Payment in full is enclosed ☐ $200 deposit enclosed
☐ Charge my credit card.

Signature _____ Card No. _____

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*(Full payment only). SM 181

By Janet L. Hopson

A queer mammal of ducklike bill and reptilian walk

When it was first described, Australia's platypus was considered to be a fake, and the more we know the odder it gets

With December flowers marking the onset of the Australian summer, Frank Carrick, a field biologist at the University of Queensland in Brisbane, heads for the bush in search of the continent's most unusual animal. The duckbill platypus, his object of interest for nearly a decade, is secretive in the wild, difficult to keep in the laboratory and expensive to study. It is no wonder that, despite Carrick's energy and ideas, the platypus remains a scientific enigma as much as it is a natural paradox.

Although it is among the most ancient and primitive of mammals, a significant amount of the basic biological information about the platypus has been gathered by Carrick and his colleagues in just the last five years. The more one learns about this strange amphibious animal, however, the less surprising details like this become. It is a Mad Hatter's mammal, a creature of perversity and contradictions. And if there were such a thing as a true missing link in mammalian evolution, it would surely resemble this beast.

The duckbill platypus is a land mammal with fur that lays leathery eggs like a reptile. It has a flat rubbery bill, no teeth and webbed feet like a duck. It suckles its young with milk, but has no nipples. It lives and feeds in rivers and lakes, but sleeps in burrows in the bank. It is crepuscular, that is, active mainly at dawn and dusk. And the male has venom glands, and can strike like a snake with its hind-leg spurs. In Australia, the platypus has sometimes been called a "bits-and-pieces animal"—a fitting nickname.

Frank Carrick first began his studies while a doctoral candidate at the University of New South Wales, located in a quiet section of Sydney, close enough to pristine lakes and rippling streams so that the soft-spoken, bearded researcher could trap and study platypuses. Unfortunately, however, answers to the mysteries of this mammal are harder to find than the creatures themselves. Carrick now works at the University of Queensland Department of Veterinary Anatomy in Brisbane. He still has ready access to the animals in the semitropical Queensland bush. But ask him about the platypus' renowned appetite, or its social behavior or its venomous spurs, and he is likely to reply, with both scientific caution and true puzzlement, "We still don't know," "That's a good question," "We really can't say."

Mystery seems to be a permanent platypus appurtenance, as real as the animal's elastic bill or plump beaver tail. It is so unlike other animals that when dried specimens were first sent to England in 1800, they were widely believed to be fakes. Not long before that time, imported "genuine mermaids" had been a popular and expensive fad item in Europe. When these turned out to be not sirens of the deep but monkeys' heads stitched to the bodies of fish from the China Sea, people were not amused. They were therefore not about to fall for a fraudulent beaver with a duck's bill and webbed feet attached by a similar clever process.

Strange beasts in the bush

The next year, however, a platypus preserved in spirits was sent by ship to a British zoologist, who dissected the remains and pronounced it real. It was originally given the Latin name *Platypus anatinus*, "flat-footed animal like a duck." A German scientist, sent his own specimen, had independently named it *Ornithorhynchus paradoxus*, meaning "bird's beak animal, a paradox." Eventually, because *platypus* had previously been used for a genus of beetles, zoologists compromised on *Ornithorhynchus anatinus*, and settled down to describe its every anatomical oddity.

They began with observations in the wild. European naturalists, transplanted halfway around the world to the Australian bush, sent back some extraordinary descriptions of wildlife from this remote island continent. There were reports of enormous hopping animals with pouches and tiny arms, as well as stories of huge burrowing guinea pigs which the aborigines

Platypus' bill is rubbery skin stretched over bone; its ears are in furrows just behind its eyes.

Photographs by Frank N. Carrick

Frank Carrick, leading platypus researcher, prepares to release one for continuing study in the field.

Early platypus portrait was made by I. W. Lewin in 1810, about a decade after the first dried specimens

called "wombats" and which would attack an enemy headlong, and incidentally made a fine dinner. The strangest, however, were the descriptions of the duck-bill platypus. It was called an amphibious mole, a miniature otter, a beaver with a beak and "a combination of fish, bird and quadruped." It was reported variously to be large, small, rough, smooth, horny billed, rubbery billed, docile and dangerous. The conflicting observations were ironed out over several decades, but the underlying cause of them remained the same—the platypus is both a creature of dusky hours and extremely wary of watchers.

On a recent trip to Australia, smitten by an uncontrollable curiosity to observe the shy creatures in their natural habitat, and thus follow in the footsteps of the early naturalists, I engaged a guide in the tropical city of Cairns, which lies on the northeast coast of Australia, just 50 miles from the Great Barrier Reef. It, like Frank Carrick's home in Brisbane to the south, is in the state of Queensland. Our guide drove southwest of Cairns through a farming region where the air is heavy with the fragrance of ripening sugar cane. The road snakes upward through dense tropical rain forest that receives, on an average, more than an inch of rain each day. It finally breaks out into a high plateau, where cattle graze on rolling hills. In strange counterpoint, however, kangaroos and wallabies graze in the same pastures, and brilliant red-and-green king parrots call from the roadside fences.

It is here, in meandering streams that cross riffles and widen into deep pools, that one can find duckbill platypuses. They can also be seen in freshwater lakes and streams throughout much of eastern Australia and Tasmania. It is hard to imagine, however, a more appropriate setting for the mystery mammal, since, on this particular day, periods of harsh white sunlight were alternating with a cold, fine, penetrating rain; patches of fog clung to the low areas like heavy smoke, and from the trees, kookaburras trilled their odd, insistent laughter.

Our guide's favorite viewing spot was a quiet pool where the road bridge crosses a millstream. We arrived at dawn and, with excitement, quickly sighted a dark shape move in the water. Alas, it was only a small log, bobbing in the breeze. We soon witnessed concentric rings rippling on the surface—a large water beetle. And we noticed a pair of tiny black eyes pop up suddenly—the face of a monitor lizard.

At first I had hoped for a truly spectacular sighting —perhaps two or three pairs of males and females paddling their bizarre, circular mating swim in interlock-

Janet L. Hopson is a free-lance writer. Her article on pheromones was in the March 1979 SMITHSONIAN.

reached England where few people were taken in by these "fake beavers" with ducks' bills, webbed feet.

Another of Carrick's research platypuses is let go, climbing out of transport box after trip from the lab.

ing patterns à la Esther Williams. After two cold, wet hours, however, any modest evidence would do; the clever beasts had evaded us just as they had the more skilled naturalists of the past. At last our guide was fairly certain he saw a platypus dive behind some reeds, and I thought I *might* have heard the splash. So we called it a morning, satisfied we had been in the hushed presence of what is probably the world's shyest mammal.

For all the mystery about it, the platypus, upon capture and close study, has turned out to be a fascinating creature. It is foremost a warm-blooded, furbearing mammal that has adapted to an aquatic niche, much like the beaver. Its webbed feet are by no means unique for a mammal that lives in water; the trial and error process of evolution has dealt the same basic solution to water shrews, beavers and otters. Its bill is another matter. While it looks from a distance like the horny beak of a duck, and is also used to strain food particles from the mud and sand, it is soft, rubbery and highly sensitive. While submerged, a platypus closes its eyes and ears (which appear as slits just behind the eyes). The animal's sensitive bill is therefore its only means of locating insect larvae, crayfish and small frogs. "Splash," one platypus kept for display in the 1930s, is reported to have fallen into quiet ecstasy whenever his keeper stroked his rubbery bill.

One is well advised, however, not to approach a platypus from the opposite end. The males have spurs on their hind legs equipped with venom and capable of inflicting serious wounds. Zoologists have argued for nearly two centuries about the purpose of these venom or "crural" glands and the thornlike spurs. Some insist they are used to immobilize frogs and other large prey. Others think they are used for defense against predators—sea eagles or dingos—or for offense against other male platypuses in spring jousts. Serious scientists like Frank Carrick would like to see more controlled field data before deciding. Dr. Carrick points out that the most extensive study of the venom apparatus of the platypus has been done by Dr. Peter Temple-Smith, who believes its major role is in the spring jousts.

Although it has been portrayed as such, the platypus is not some walking fossil. It is well adapted to the modern habitats and foods upon which it survives. Yet while it does not dwell in steamy Carboniferous swamps, the platypus does share certain traits with reptiles. These suggest that it may have evolved from animals intermediate between the ancient cold-blooded, egg-laying reptiles, and the furry, warm-blooded, live-young-bearing mammals.

In addition to the venom gland, the platypus has a distinct reptilian walk. Its limbs extend laterally

One of platypus' strangest features is the dangerous spur on the male's hind legs, for release of venom.

rather than below, and the body bends sideways with each step on land. Its thick tail, which stores fat, has been compared to the sausagelike appendage of the stump-tailed lizard, particularly in the young platypus. And although the duckbill has dense, fine fur—there are so many hairs to the square inch that the numbers have never been counted—the shafts are arranged in a fur tract much like the scale patterns of snakes and lizards.

Most startling of all its reptilian traits, however, is the animal's reproduction by means of leathery eggs. This habit is shared by just one other kind of mammal, the spiny anteaters or "echidnas," also found only in Australasia. The trait is so remarkable that these animals are placed in their own taxonomic division, the Monotremata, the other mammal groups being the pouch-bearing Marsupialia and the true placental mammals or Eutheria.

The notion that the platypus might lay eggs rather than give birth to live young remained controversial for nearly a hundred years before being resolved by Cambridge zoologist W. H. Caldwell in 1884. Caldwell traveled in that year to Australia, investigated the animal's reproduction and sent back a now famous four-word telegram, "Monotremes oviparous, ovum meroblastic." This scientific shorthand meant that platypuses and echidnas do indeed lay eggs, with a yolk that acts, during embryonic development, like that of birds and reptiles.

Ironically, many of the finer details of this fascinating manner of reproduction remained only vaguely understood until the 1970s, when Frank Carrick began an intensive study based on earlier work. Carrick explains that many Australian zoologists have had "emotional hangups" about studying the platypus since it was nearly wiped out by fur traders. Before the creature was strictly protected in 1906, more than a million platypus pelts were taken annually and sewn into rugs.

Although the animal is high-strung, delicate and hard to maintain in the laboratory, Carrick and colleagues Tom Grant, Leon Hughes and others carried out and published several important studies in the late 1970s. These revealed that monotreme reproduction is squarely intermediate between reptiles and mammals. "The platypus is therefore," Carrick says, "a pivotal creature for understanding the evolution of live birth."

To begin with, the reproductive anatomy of both males and females is a hodgepodge. Each has a cloaca (a single combined outlet for all excretory and reproductive functions) like a bird or reptile, rather than separate outlets. The female platypus has a functioning ovary on just the left side, as do female birds. She has egg-white and shell-forming cells similar to reptiles' to build the protective coatings for her embryos. And the male has undescended testicles like reptiles (and certain other mammals such as the elephant).

An evolutionary jumble that works

The working of all these parts is still more jumbled. Although two eggs are normally fertilized and are each enveloped with a leathery reptilian-type shell, they *grow* as they pass down the oviduct. They begin as yolky orbs the size of garden peas. But unlike bird or reptile eggs, which remain the same size from formation to hatching, platypus eggs enlarge five times to the size of sparrow's eggs. They do this by absorbing nutrients from the womb in a manner analogous to the "feeding" of a live embryo by the placenta. Carrick and colleagues confirmed findings of half a century ago that within the single platypus ovary, a structure is formed called a "corpus luteum" (literally "yellow body"). It gives off hormones to support the growth and development of the shelled eggs. The corpus luteum occurs in all mammals but not in reptiles or birds.

Since platypus eggs have a permeable coating that allows nutrients to enter, the yolk does not have to be as large and rich as in bird or reptile eggs. The corpus luteum, in turn, supports this nutritive process. Since, says Carrick, platypuses display both the ancient condition of laying eggs, yet also the smaller mammalian yolk and the corpus luteum, they show something of an evolutionary continuum in one furry wrapper. They are therefore, Carrick repeats, excellent crea-

EARLY TIMES.
THE WAY IT WAS, IS THE WAY IT IS.

1871. A hastily arranged reception for a pioneer balloonist.

On July 4, 1871, an astonished crowd in Kalamazoo, Michigan beheld a lone balloonist descend from the sky. He was Professor Steiner, the first mortal to fly across Lake Michigan. And even then, what would have been more appropriate at a welcoming party than Early Times. The whisky that made Kentucky whisky famous.

Today, we're still slow-distilling it the same way we did then. And thoughtful people always have several bottles on hand for friends who drop in out of the blue.

1860 *TODAY*

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tures for understanding how and why live birth originally evolved.

The female's way of feeding her young may also have presaged a now widespread feature, the nipple, shared by most male and female mammals. Although the platypus has no teats, she feeds her young with milk. When her time comes, she seals herself into an earthen chamber to lay eggs, which hatch into tiny, hairless, white-skinned bratwurst. Milk begins to flow from glands under the skin of her abdomen that look like the mammary glands of other mammals. The infants, in turn, suck it up with their soft "milk bills." The more elaborate mammary equipment of later mammals may have had its evolutionary beginnings in modest milk glands like those of the platypus in some extinct half-reptile, half-mammal.

Similarly, the male generates sperm that are not shaped like the wriggling, miniature "tadpoles" found in other mammals. They are more like the tiny "threads" found in birds and reptiles. The male platypus also shares certain structures with some later mammals—internal testes, and a rich blood supply to these organs through long, coiling arteries.

In order for Carrick and his colleagues to study male and female platypuses in such detail, they first had to develop modern ways to catch and keep them in the laboratory. Earlier naturalists had often drowned them by catching specimens in standard weighted nets. Carrick and Tom Grant therefore designed a net without weights so the animals could carry themselves to the surface and breathe until taken into the laboratory. Once inside, however, the animals'—and keepers'—problems compound, beginning with the platypus' incredible appetite. Platypuses eat up to half their weight each day, and at times even more. The champion feed was recorded in 1943 by David Fleay, at that time director of the animal sanctuary at Healesville, Victoria, just outside Melbourne. Under Fleay's care, Correy, the only platypus to hatch in captivity, was born to Jack and Jill. At the peak of nursing her rapidly growing youngster, Jill emerged one evening from her nesting burrow to consume 400 earthworms, 338 ground grubs and 38 crayfish. The combined weight of these items was one and three-quarter pounds, equal to her own body weight at the time. With that kind of appetite, Fleay estimated that in the wild it would have taken Jill as many as 14 hours of continual foraging to feed herself and produce milk.

When Carrick began his laboratory research, he had the benefit of Fleay's experience, but the circumstances were even more demanding. He and his coworkers had to manipulate the skittish animals regularly: weigh them, take blood samples, move them from one place to another in their elaborate set of swimming tanks, wooden tunnels and resting chambers. The animals required new dry grass each day, dry soil, clean tanks and the usual array of fresh worms, insects and shell-

Using its webbed feet to propel it, platypus swims in search of food. When submerged it keeps eyes and ears

fish. "But in spite of all this care and every precaution," says Carrick sadly,"three of our eight platypuses died in captivity."

Carrick and his colleagues are also doing some ecological studies in the platypus' own habitat. A recent one focused on the animal's curious appetite—what it eats in the wild, and why so much. They found that its favorite food is insect larvae and that, oddly, it doesn't seem to eat as much in nature as in captivity. The reason for this discrepancy is still unknown.

Equally unsolved are the mysteries of the male's poison spurs and the animal's social behavior. Carrick's group found that in one stretch of the Upper Shoalhaven River in New South Wales, 14 to 18 platypuses shared the same general area. The researchers trapped, leg-banded and tagged some of the animals with brightly colored tape so individual movements could be followed. But despite hours of cold, wet observation, and the recording of mountains of other details, the utility of the poison spur was never clear.

"It would take a team of 10 to 20 people and $100,000 per year or more," says Carrick, to properly ferret out answers to the remaining mysteries of the platypus, including its position in the evolutionary continuum from reptiles to mammals (but adds that even much more modest sums would be a considerable help). He thinks the Australian government's research priorities should be skewed a bit more toward the most unusual mammal on Earth.

Part of Carrick's frustration is knowing that the answers to important anatomical, physiological and evolutionary puzzles lie in further laboratory study of the platypus. Yet, at the time of my visit to Australia, Carrick's platypus lab was too hot to be used, and the only evidence of his dedicated interest was a stuffed platypus in a glass box on his desk. Some $2,000 worth of air-conditioning equipment was sitting on the lab floor, but Carrick had not yet managed to find the extra $1,000 needed to install it. "So near, and yet so far!" he exclaimed, referring to the equipment. But he might have been speaking of our understanding of the platypus as well.

closed, using sensitive bill to locate insect larvae, crayfish or small frogs. On land it dines on worms.

Graham Pizzey

COME TO A PLACE W
FIND BURIE

Two centuries ago, the pirate Blackbeard roamed the rugged coastline of North Carolina.

It was here he won his legendary treasures.

And it was here that, in the end, he lost his life.

The pirates and their gold have come and gone.

But the treasures are still here for the taking.

The ocean, gold in the sunset, diamond-sparkled in the cool Atlantic dawn.

Gleaming shells in jewel colors, half-buried in pearl-white sand.

Silk-surfaced lakes. Bright rivers winding like silver threads through

HERE YOU CAN STILL D TREASURE.

the soft, rich tapestries of growing fields.

Sapphire mountains, set into emerald valleys.

The perfume of pines and azalea blossoms and fresh-turned earth.

In North Carolina the treasures are everywhere. From the Appalachians to the rolling farmlands, all the way to the secluded cove where Blackbeard fought his last battle.

Some, like the shells, are the kind you can carry away in your hands.

But most of them are the kind you'll probably carry away in your mind.

NORTH CAROLINA

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Text and photographs by Alistair B. Fraser

To see a dazzling festival of light, just raise your eyes

Rays traveling through the atmosphere are reflected, refracted, bent and interfered with. The results can sometimes be breathtaking

"Dazzle mine eyes, or do I see three suns?" exclaims Edward in Shakespeare's *Henry VI*, Part III. Edward and his brother Richard interpret the appearance as a good omen; but alas, the day is lost, for their father, the Duke of York, has been killed.

From time immemorial people have seen strange lights in the sky and, as often as not, have interpreted them as omens. And while the basis for political or personal omens in the sky is insubstantial, the basis for weather omens stands on firmer ground. A large ring of light around the sun or the moon has been recognized by many cultures as a sign of rain.

The dazzling phenomena pictured on these pages are nothing but sunlight that has been bent by our atmosphere or by something in it. The triple sun (pp. 76-77) and the ring around the sun; the arcing colors of rainbows, coronas and glories; blue skies and red sunsets; the optical tricks we see as mirages; and the legendary green flash—all tell us something about what's happening in the atmosphere. For the mock suns witnessed by Edward and Richard or the ring that we have all seen, that something is tiny ice crystals falling out of a cloud. Each crystal can act as a miniature prism that either reflects or refracts the sunlight to make a spot of light in the sky. Refraction oc-

Rainbow in Sweden arcs over "pots" of golden wheat. Typically, not all colors in spectrum are visible.

Lasting but a moment, an island of green light floats up off the top of the sun as it sinks into the Pacific.

An unobstructed view of the horizon and a haze-free sky at sunset or sunrise are needed to see the flash.

curs when light rays change their direction as they pass from one medium to another, here from air to ice. It is what causes a straight pole sticking up out of the water to appear to be bent. And because the change in medium bends some wavelengths of light more than others, the "white light" that enters the ice crystals sometimes emerges as colors.

Spots, arcs and rings of light trace elaborate geometric patterns across the sky. Not only the type and size of the ice crystal, but also the height of the sun above the horizon, determine the particular pattern. Some, like the ring around the sun or moon, are so common that they are seen by even casual observers and as many as 100 times a year. On the other hand, the circumhorizontal arc—color bands parallel to the horizon (p. 79)—can be seen in the middle latitudes only around midday for a few weeks on either side of June 22.

If ice crystals in the air create striking patterns in the sky, so do the water drops of clouds and rain. Best known is the rainbow. The rainbow is a very personal phenomenon. If you move, it moves. The ephemeral nature of the bow may account for that symbol of the unattainable, the pot of gold at its end.

Perhaps more than any other optical phenomenon, the rainbow has captured the imagination of Man. Variously cast as a god, a symbol and an intellectual challenge, it has seemingly been given a name and embellished with tradition by almost all cultures. The ancient Greeks deified the rainbow as Iris, messenger of the gods, but she carried news of war, trouble and death. Many African and South American tribes held that the rainbow was a serpent and that it devoured men or beasts, while other peoples saw it as a giant net poised to capture their souls.

Today we recognize the rainbow as sunlight that has been bent by raindrops. The light is refracted as it enters, is reflected while inside, and then is refracted again as it exits each drop of rain. As each color is refracted at a different angle, the colors are separated to produce the familiar primary bow with red on the outside (closest to the sun). If reflected twice inside a

The author is a professor of meteorology. This article is adapted from his chapter in Fire of Life, *soon to be published by Smithsonian Exposition Press.*

The shadows of the backlit clouds at bottom stream across the sky over Moose Jaw, Saskatchewan.

The rays appear to fan out because of perspective: the original light rays from the sun are parallel.

drop, the bent light produces a fainter secondary bow higher in the sky. This inside-out version is red on the inside. The darkest portion of the sky lies between the two bows. First commented upon around A.D. 200 by the Greek philosopher Alexander of Aphrodisias, the region is now called "Alexander's band."

The bands of a rainbow broaden as the drops get smaller. As the colors spread, they begin to overlap so much that they lose richness and become pastel. Even when a rain shower contains many large raindrops, the upper portion of the bow looks pastel because the airflow around large drops flattens them (no, they are not shaped like teardrops) so that they no longer contribute to the bow. Only near the base of the bow do the big drops have the right shape and sun angle to contribute to the bright colors—"all the colors of the rainbow."

Another phenomenon is the corona. A brilliantly colored series of rings of light around the sun (or moon), the corona is formed when the light is diffracted on its way to us by a cloud of water drops. (Diffraction is quite different from refraction. In diffraction, light rays are bent as they flow around the outside of an object so that they produce some light where simple geometry tells us the object's shadow should be.) In a corona, diffraction occurs when the light waves "wash" by either side of the drop and then, like wakes from two boats, interfere with each other, sometimes combining to produce giant waves and sometimes canceling to produce calm. The interference pattern we see, the rings of colored light, depends on both the size of the drop and the wavelength of the light: where one color is brightest, another is canceled; where the drops are large, the rings shrink, but where the drops are small, the rings grow.

This corona is not to be confused with the astronomical phenomenon of the same name. The astronomical term refers to the tenuous outer atmosphere of the sun itself. But the word corona, meaning crown, was applied to the crown of cloud-diffracted light in our own atmosphere long before it was used to describe the astronomical phenomenon.

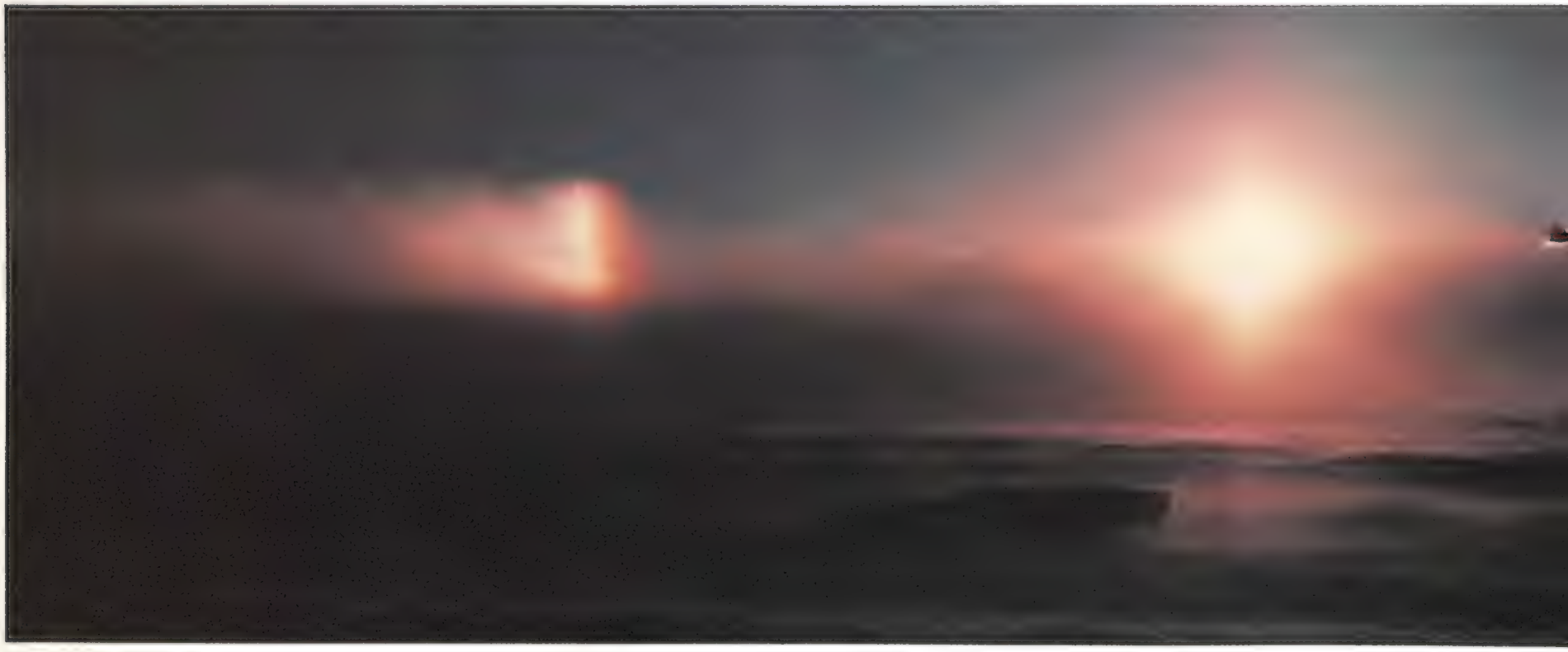
Although the meteorological corona, at its best, is one of the most spectacularly colored light shows in the sky, few people have ever seen it. It is so very bright, when seen around the sun, that the intensity

Text continued on page 78

A glory surrounds the shadow of an airplane as it flies over the cloud-shrouded Isle of Jersey.

Tiny ice crystals produce a halo around the sun, here blocked by a tower at the University of Washington.

With the sun itself hidden by tree leaves at bottom, brilliant corona can be seen to full advantage.



Parhelia, known as sun dogs or mock suns, flank the sun in picture taken in Skaneateles, New York.

Light waves bend as they come around cloud drops, then combine with original waves to produce bands.

Jim Brandenburg

These apparitions, long considered omens, are caused by larger versions of ice crystals that make halos.

The magic of a mirage makes a tugboat disappear on Kootenay Lake in British Columbia. At top, boat begins to vanish from bottom up. At center the hull has vanished, and pilothouse sits on an inverted image of itself. At bottom, in right center, only the deckhouse roof and smokestack can still be seen.

of the light must somehow be reduced. Newton found he was able to view it by looking at the reflected image in still water. Possibly a more convenient way is to block out the sun itself with your hand, or the edge of a building, and then view the corona through a couple of pairs of sunglasses. The results are spectacular when the cloud is just right.

More subtle in its colors but easier to view is the glory. Visible around a shadow when it is cast onto a cloud, the glory is most readily seen from aircraft (p. 76). In fact, so frequently does it appear around the shadow of a plane that aviators somewhat proprietarily refer to it as the "pilot's bow."

The glory is an exceedingly complicated optical phenomenon. For it to be seen, light that enters one side of a drop must exit the opposite side. Light that enters that opposite side must come out the first side. Then the exiting light waves interfere with each other to produce a pattern similar to the corona.

Clouds are not necessary, however, for the creation of striking displays of color in the sky, as testified by the blue of the sky and the colors of twilight. When sunlight encounters air molecules or small dust particles it scatters in all directions. The blue light is more strongly scattered than are the other colors so that, during the day, the light we see scattered off the air above us is blue.

When the sun is low in the sky, the light that reaches our eyes directly from the sun has traveled for a very long distance through the atmosphere and so it has had almost all the blue scattered out of it. The setting sun may thus look red. This red light also shines on the air between us and the horizon, and so the horizon also looks red. To say that the light is red is not to say that other colors are completely absent, only that they are much weaker. The light is almost completely lacking in blue, so that as the sun dips below the horizon and its light shines on the air before us, there is little or no blue light to be scattered toward our eyes. If the green (next to the blue in the spectrum) has not been depleted from the original beam, it will now be scattered toward us. In this way, the twilight sky can display a rich range of colors other than just the red at the horizon and the blue that is directly overhead.

Often seen tracing a fan of dark lines across the twilight sky, crepuscular rays (bottom right) are actually the shadows cast on the air by distant mountains or clouds. These lines, which appear to diverge, are in fact parallel: their fanlike nature is the result of perspective. Sunbeams that trace their way between the clouds when the sun is high appear to do the same thing (p. 75). Also appearing to diverge from the sun, these sunbeams are occasionally mistaken for streamers of rain.

As well as scattering sunlight, the atmosphere can bend it in a much more subtle way. The speed at which light travels through the atmosphere depends on the density of the air. Gradients of density cause the light to bend, for if one side of the beam is going slower, the light will turn. The effect is small, but it can nevertheless cause our atmosphere to behave like a giant lens, bending and distorting the apparent shape of distant objects. This is the origin of mirages. Far from being an illusion, a mirage is just an image formed when our atmosphere acts like a lens.

Near the surface of sun-heated ground or water, the warmer, less dense air causes glancing light rays to be bent away from the surface. Mirages are very common over bodies of water where they are regularly confused with reflections: the mirage, too, sometimes presents an inverted image to our eye. But by carefully observing a mirage, it is fairly easy to distinguish it from a reflection: the bending rays of light can cause distant objects to disappear. I have watched a tugboat vanish slowly from the hull up as it moved up a mountain lake in British Columbia (p. 77).

If the images of Earth-bound objects can be wildly distorted, so can the image of the rising or setting sun. In addition to distorting the solar image, the atmosphere also acts as a prism to shift slightly the positions of the colors. This puts a blue or green rim on top of the setting sun (or any other astronomical body) and a red rim on the bottom. Although very thin, this green rim is occasionally magnified by the atmospheric lens so that a momentary flash of green light is seen on the crest of the sun. This is the "green flash." Scottish legend assures us that all errors in matters of the heart will vanish for those fortunate enough to see it. Sufficient reason, surely, to try to see this most ephemeral, but most striking, of all the dazzling phenomena that grace our sky.

Steven Hodge

Circumhorizontal arc, a halo that lies parallel to ground, sweeps sky over Mt. Olympus in Washington.

Shadow streaks from distant mountains punctuate twilight colors over Vancouver, British Columbia.

By John Francis Marion

On New Year's Day in Philadelphia, Mummer's the word

Each January, thousands don outlandish costumes and strut to the thumping beat of string bands in a colorful tribal parade

Bill Wicker (left) and Francis Fox jr. of Hegeman String Band belt out music as they march. One of 23

"Fellas, if you don't play Part 17 right, we won't play 18 at all!" Anthony D'Amore, music director of the Durning String Band, exhorted his charges to try harder. On this autumn evening at the Italo American Bocce Social Club in South Philadelphia, the band was rehearsing for its annual Big Event: the New Year's Day Mummers Parade, known to be an absurd, hilarious, fraternal party. The city has excelled at some form of grassroots holiday revelry since pre-Colonial days—well before Founding Father William Penn turned it into a Quaker Colony in 1681.

During the 32 years that I have lived in Philadelphia, I've witnessed the gaudy spectacle on many a frigid day, but this was my first time behind the scenes.

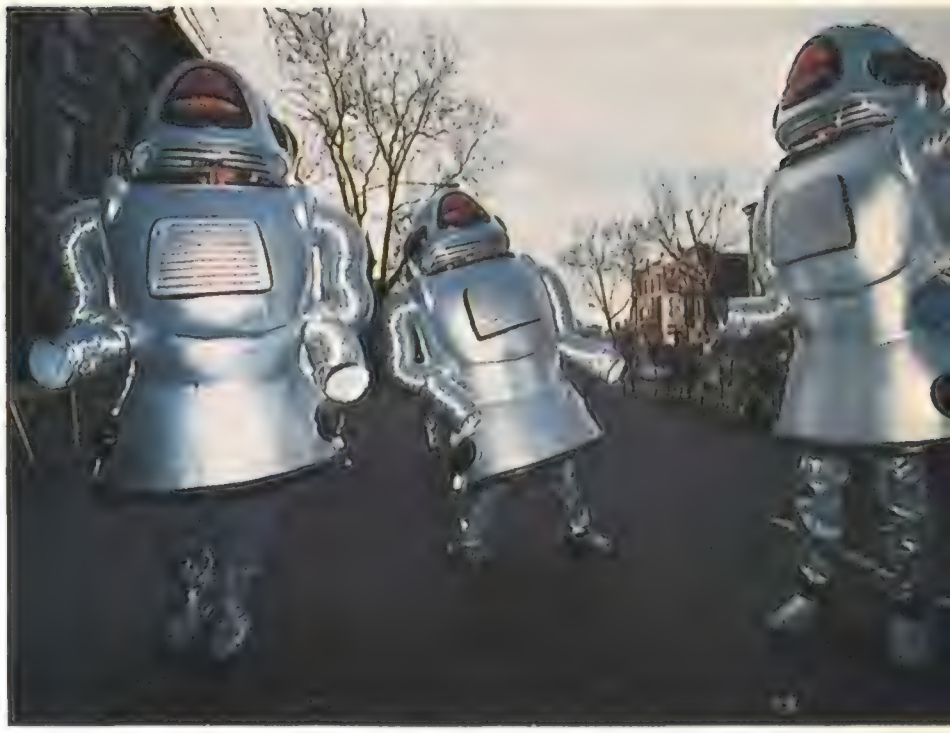
"The village idiot," joked Charlie Scache, 38, a salesman who has been a Mummer for 19 years, when I asked him to define one. Then: "Men whose common bond is music. It requires almost the same faith and dedication as religion does." Charlie's pal Leo Volz, a 40-year-old production control man, has been a Mummer for 16 years; they both play the banjo. Leo's son, a bell player with the Greater Kensington String Band, was seven when he started competing. There are third-generation Mummers, too, and rivalry is intense within families where fathers, sons, brothers and grandfathers belong to different clubs. The standard Mummer's greeting is "I wish you No. 2!" (in the yearly competition for cash prizes).

The regular rehearsals have proved hazardous for some. "Lots of broken marriages because of the string bands," Charlie confessed. Membership is a yearlong way of life. Rehearsals are once a week through September, then twice or three times weekly until the parade. Add community engagements every weekend, and a Mummer's wife sees less of him than a wife who loses her spouse to golf. But the money earned from these bookings pays for the costumes. With plumes at least $2.50 each and boas as much as $25 a yard, it costs about $25,000 to outfit a proper band. When there wasn't enough in the club treasury, Leo told me, members have mortgaged their homes and paid off the loans when the prize money came in (in 1980, the city

The author's Bicentennial City *is a book about his adopted hometown, Philadelphia, through which he often leads Smithsonian Associates tours.*

Photographs by John McGrail

in 1980 parade, this band played for visiting King Carl XVI Gustaf of Sweden at a Bicentennial dinner.



Clad as robots from outer space, three waddling men of Liberty Clown Comic Club strut their stuff.

Taking the whole thing most seriously, an unarmed "knight" in shining armor joins in the march.

council awarded the winners a total purse of $300,000).

Excluding those mortgages, what really is it that makes some 23,000 men and boys (and lately a few women) encase themselves in rainbow colors and march? Solely the prizes? No; try excitement. "Going up Broad Street," Charlie grinned, "when you reach the College of Art, the crowd starts going crazy," and when the tall buildings swell the decibels, he added, "the adrenalin starts flowing."

More players drifted in to the rehearsal: a policeman, a fireman, a Navy Yard worker, the head accountant of a large firm, three teen-agers, a mailroom employee from the Philadelphia *Bulletin* (a seminarian comes when he can, which was not that night). They tuned up like a symphony orchestra—saxophones, banjos, drums, violins, a bass fiddle. Instru-

These posturing clowns are in the Hammond Comic Club, one of five such clubs in the annual parade.

Philadelphia Mummers parade

A dazzling figure of the "fancy brigade" called the Vikings. Of 18 brigades, they came in sixth in 1980.

As ornately decorated as the City Hall behind them, these Mummers are from the Charles Klein Fancy Club.

ments are only reeds, percussion and strings, with no electrical amplification allowed.

D'Amore blew his whistle and the rehearsal began. "Fellas," he urged on the fourth song, "let's open up!" —and they did. *Happy Days Are Here Again* filled the hall; the band was swaying in time to the beat, some members singing as they played. The tune moved with color and vitality. Something had been released that would confound the most erudite musicologist.

Later, Charlie took me to see his band's costumes. In the old days they were made by the Mummers and their families, but today a costumer who also has a bridal salon creates them. Only the elaborate bejeweled backpieces (some can weigh 170 pounds or more)

Their expensive, heavy costumes, worked on all year long, can—and sometimes do—wear them down.

Another member of the fancy club at left, Joe Landry pauses near City Hall.

Centerpiece of this monstrous winged apparition is Walt Wies, captain of the Oregon Fancy Club.

One man carries this display of Hog Island Fancy Club; its 1980 theme was "Blue and Broken-hearted."

that each wears, attached to a leather harness, are fashioned in the clubhouses.

In this century the official parade has been held every year except 1919, when the Armistice had just been signed and many men were still in uniform, and 1934, when the Depression had deepened and the clubs could not afford costumes, nor could the city afford prizes.

Historically, the New Year's Day Parade results from a blend of cultures that thrived in this city from the early half of the 17th century through the early part of this one. English roots go back to 15th-century Christmas Mumming Plays. (Mumming comes from the German word *Mumme*, meaning disguise or mask.)

Philadelphia Mummers parade

Local tradition has it that as early as the 1620s the Swedes and Finns in Tinicum—now a southwestern section of the city—celebrated the New Year by shooting off guns (they were often called "the shooters"), banging pots and pans, and making a clamor as they visited neighbors after Christmas.

All this noisemaking was not to everyone's taste. In 1808 an act declaring that "masquerades" and "masquerade balls" were "common nuisances" was pushed through the legislature, although there seems to be no record of its ever having been enforced, and in 1859 it was repealed. The Chain Gang—the earliest club for which there purports to be evidence—was organized in the 1840s. The Golden Crown recruited members from east of Broad Street and probably first marched in 1876. Not to be outdone, Mummers west of Broad formed the Silver Crown. The January 1, 1881, *Public Ledger* reported that "parties of paraders" made the street "almost like a masked ball."

String bands are a hallmark of this city; those already organized at the turn of the century bore names like the Dark Lanterns, Early Risers, Mixed Pickles, Red Onions, White Turnips and Golden Slippers. In 1901 the Trilby String Band (founded in 1899 and still going strong) first marched. Only in 1906 did the bands begin to compete for cash. Earlier, they had vied for simple cakes. They would parade through the neighborhoods, collect cakes from housewives and bakeries, then hold a cake-cutting ball. Andrea Ignatoff-Rothberg, former curator of the New Year's Shooters and Mummers Museum, finds a "remarkable similarity" between the high-stepping two-step, or cakewalk, a national dance fad that swept Victorian America, and the Mummer's strut—a low, slouched, rhythmic, bent-knee dance, in which the participants weave back and forth in time to the music.

Last year I noticed that each time a string band started to play, the spectators started to strut too. One elderly woman left her place on the sidelines and began a cadenced weaving among the marchers. A policeman, also moving in time with the music, gently guided her—still strutting—back to the curb; she was welcomed with cheers and cowbells.

Marching clowns like to run to the crowd and plant kisses—and greasepaint—on some of the women. While the Mummers have always recognized the distaff side in this flirtatious way, it was not until the mid-1970s that women marched with men, without disguise.

One adventurous woman did break the rules back in 1929. The Mummers would rather forget Laura Lee, a local reporter who confounded them by appearing as an Eskimo dubbed "Miss South Pole." She identified herself as "Commander Byrd's latest lady friend." Not until 1977 did a woman win a prize: $225 for "the Bride of Frankenstein."

Women are not the only ones who have altered the Mummers' style. Blackface was a tradition until 1964 when official city policy ruled it out, bringing to an end the dissension that had grown between civil rights groups and the clubs. Blackface makeup—burnt cork or charcoal—had been used by Mummers since the earliest days, "the lampblack period." Blacks had, in fact, participated in the parade as Mummer clubs: in 1906 the Golden Eagle Club, then 40 years old and exclusively black, fielded 300 marchers. But the last black groups to appear were in the late Twenties. Times changed and by the mid-Sixties, the black community understandably took offense at the makeup, which today is no longer permitted.

The Mummers inadvertently gave me my favorite memory of the Bicentennial year. In the Union League, bastion of all that is secure and traditional in the City of Brotherly Love, the Delaware Valley Swedish American Bicentennial Committee gave a dinner to honor King Carl XVI Gustaf. The last entertainment on the program was the Hegeman String Band. As it played, a Mummer of kaleidoscopic excess —all glitter, gilt, fringe and fantasy—appeared and started to dance before the king's table, then to weave in and out among the others. One redoubtable matron could resist the pulsating rhythm no longer. She joined the dancer. Soon a second, a third and then the multitude followed her. The king looked stunned. Security officers became alarmed and linked arms to surround the royal table, but they need not have worried.

"What are these Americans doing?" asked the king.

"They are strutting, your Majesty!"

Stepping high at head of Hegeman String Band is Captain Tom Howley, telephone employee in real life.

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By Piri Halasz

German Expressionism, explosive art movement in a troubled age

Thyssen-Bornemisza Collection, Lugano

In the years before and after World War I, Grosz, Kandinsky and others infused painting with passion, color and doomsday prophecy

Only 30 years before, in 1871, Otto von Bismarck had united city-states, principalities and kingdoms into a sprawling empire of some 50 million souls that stretched from the sandy moors and bustling ports on the North Sea to the onion-domed churches of the Bavarian Alps to the south, incorporating the booming industries on the Rhine and the estates of the Junker aristocracy in East Prussia. The shock of nationhood had come late to Germany, and would shortly release ugly aggressive instincts that wasted the Continent. Yet at this earlier time, and at diverse spots throughout this still richly individualistic country, conditions also liberated vigorous, healthy outbursts of creative energy.

Such an outburst was gathering steam in the studio of a fervid 24-year-old artist named Ernst Ludwig Kirchner, in the pretty Baroque town of Dresden, around 1904. An equally committed 21-year-old named Erich Heckel was joining Kirchner at his labors, and a third, Karl Schmidt-Rottluff, was to follow. As Kirchner recalled it, "This utter devotion shone in Erich Heckel's eyes the first time he came to my place to draw from the nude and loudly declaimed *Zarathustra* as he climbed the stairs; and [a few] months later, I saw the same radiance in Schmidt-Rottluff's eyes when he came to us, seeking freedom, like myself, in free work; and the first thing for the painters was free drawing of free people in free naturalness."

The declamation was, of course, from *Thus Spake Zarathustra,* Friedrich Nietzsche's philosophic ode to the Superman; his mystical pronouncements were to the youth of a more innocent Germany what Kahlil Gibran was to be to the American counterculture of the 1960s. Heckel may well have recited these lines:

"Man is a rope, tied between the animal and the Superman, a rope across a chasm.

"A perilous crossing, a perilous wayfaring, a perilous staying-behind, a perilous shuddering and halting. The greatness of man is that he is a bridge. . . ."

George Grosz' *The Great City,* 1916-17, is a panoramic view of the wartime collapse of a once-stable society.

The group called itself "*Die Brücke,*" or "The Bridge." They were to be among the leaders of German Expressionism. Being German, Expressionism had to have its philosophical underpinnings. Being German, it had its music, the passionate dissonances of Arnold Schönberg and Alban Berg. There were Expressionist plays and poems, novels and architecture, even Expressionist movies, such as *The Cabinet of Dr. Caligari.* But most especially, German Expressionism meant the plastic arts: pictures blazing forth with hectic but profoundly felt forms, savagely brilliant colors, and all manner of doomsday visions.

In artistic terms, Expressionism was Germany's counterpart to the Fauvist and Cubist revolutions in Paris, but the German movement has never been as widely appreciated in America as the French ones. Observing this, Thomas M. Messer, director of Manhattan's Guggenheim Museum, argues that "If you really want to see the 20th century in its complex totality, something like German Expressionism cannot be left without a degree of emphasis." Suiting actions to words, the Guggenheim is currently showing a sumptuous exhibition entitled "Expressionism—A German Intuition, 1905-1920." Consisting of approximately 140 paintings, 70 watercolors and gouaches, and 120 prints, the show was organized by Messer, Henry T. Hopkins, director of the San Francisco Museum of Modern Art, and Dr. Paul Vogt, director of the Museum Folkwang in Essen, with the assistance of Wolf-Dieter Dube, curator of modern art in the Bavarian state collections. Made possible by grants from the Federal Republic of Germany, Philip Morris Incorporated and the National Endowment for the Arts, the exhibition closes at the Guggenheim on January 18, and will be shown at the San Francisco Museum of Modern Art from February 19 to April 26.

Aside from illustrating the remarkable range and imagination of the Expressionists, the exhibition documents the fact that, after having been ruthlessly suppressed by the Nazis as "degenerate," they are once again prophets with honor in their own land. Many of the finest pictures come from German museums and collections (though the Guggenheim is already rich in works by the leading Russian working in Germany at

Thyssen-Bornemisza Collection, Lugano

Kirchner's *Street with Red Cocotte,* 1914, was painted as war began. The artist committed suicide in 1938.

that moment, the innovative Wassily Kandinsky).

In fact, given its multitude of collaborators, what is perhaps most surprising about "Expressionism—A German Intuition" is the very personal and subjective nature of the selection involved. Neither Paul Klee nor August Macke, though active in Germany during the period covered, is included (Messer explains that Klee, a Swiss, was possessed of a sensibility too whimsical and directed toward Surrealism and fantasy to look at home with the rest of the group, while Macke, though a German, was too highly oriented toward French Fauvism). On the other hand, George Grosz and Otto Dix, best known for their later leadership of the "New Objectivity" of the Twenties, are represented with earlier, expressionistic canvases. Similarly the American, Lyonel Feininger, who lived off and on in Germany from 1887 to 1936, and is generally remembered for the more geometrical works of his later Bauhaus period, is here seen in an earlier, expressionistic phase.

The result of such a selection is that, while the full variety of styles and personalities is not captured, an amazing degree of visual consistency develops. The exhibition as a whole lets the viewer perceive the essence of Expressionism, with its Germanic concern for ideas as opposed to style, its Gothic obsession with distortion of concrete images, and its Teutonic sense of the oneness of Man with nature. As Max Beckmann, one of the greatest Expressionists, put it, "What I want to show in my work is the idea which hides itself behind so-called reality. I am seeking for the bridge which leads from the visible to the invisible."

At the start of the exhibition are ranged the early works of all the Expressionists, showing their beginnings in Impressionism and Art Nouveau. As these young artists became aware of the work of the Post-Impressionist generation which went just before them, they began to develop away from externalized, purely optical portrayals of nature and toward internalized, subjective interpretations. The Expressionists derived important inspiration from Gauguin's brooding symbolism, van Gogh's riotous colors, and the neurasthenic exaggeration of form seen in the works of Edvard Munch.

Paula Modersohn-Becker was the first of the new generation to come to artistic maturity. The daughter of a Bremen engineer, Paula Becker came to the tiny moorland artists' colony of Worpswede in 1897 at the age of 21. She married a fellow Worpswede artist, Otto Modersohn, but soon outgrew the more conventional artistic goals of the community and began to lead a nomadic life, with many a visit to Paris. Under the impact of Cézanne and Gauguin, she soon achieved a

Smithsonian fellow Piri Halasz, a former art critic for Time, *wrote about the painter Marsden Hartley in our March 1980 issue.*

Museum of Modern Art, New York

Despite the almost stock features of his Russian peasants series, this one painted in 1915, Emil Nolde was able, through force of color and design, to record intensity of his travels in Siberia.

disquieting monumentality in her archaicized studies of women and children, and especially in views of her own visage.

Emil Nolde, though briefly affiliated with *Die Brücke*, was their senior and in essence a hardy independent. Son of a peasant from the Danish border, his original surname was Hansen; he adopted the name of his birthplace. As a shy and introverted adolescent, he would go to the cornfields and lie on his back on the ground, with his eyes closed and his arms stretched out. He would think, "This is how your Savior Jesus Christ lay after men and women had taken him from the Cross." Then he would turn over and burrow into a trench, "dreaming in the vague belief that the whole great round wonderful earth was my sweetheart."

Such highly introspective religious convictions, sexual yearnings and avid nature-worship were to remain constants throughout Nolde's life, driving him to restless periods of painting in Switzerland, Munich and Paris before he settled once again, around 1903, near his birthplace. On occasion he ventured into the cities, but the longest journey he took was in 1913-14, when he accompanied an ethnological expedition that went via Siberia to the South Seas. To Nolde, forms should be as elementary as possible; they were only the vehicle that enabled him to indulge his real mania, colors—"colors in their own lives," as he said, "weeping and laughing, dream and bliss, hot and sacred, like love songs and the erotic, like songs and glorious chorals! Colors in vibration, pealing like silver bells and clanging like bronze bells, proclaiming happiness, passion and love, soul, blood and death."

Die Brücke included, in Dresden, not only Kirchner, Heckel and Schmidt-Rottluff, but also Max Pechstein, who joined the others in 1906. The first three had studied architecture, while Pechstein had been apprenticed to a decorator. Fascinated alike by van Gogh, medieval German woodcuts, African and Oceanic carvings, and every instance of the exotic, they painted scenes set in interiors and made prints

Private Collection, Essen, West Germany

and carvings in their studio on the Berlinerstrasse, employing crude outlines and a garish palette that reiterated their belief in "free naturalness."

In the summers, the artists decamped to the countryside to paint villages, landscapes and more nudes. On one occasion they took along the daughters of an artist's widow. By the side of the Moritzburg lakes, they picnicked, swam and did oil paintings of the girls. Pechstein reminisced that "If we needed a male model to set off the girls, one of us would leap into the breach. Now and again the girls' mother would put in an appearance, like an anxious hen, to make sure that the ducklings she had hatched were coming to no harm on the pond of life. She always went back to Dresden with a light heart."

Of the group, Schmidt-Rottluff was perhaps the most daring in his simplification of form. Heckel was the most delicate and lyrical (he had tried his hand at poetry). Pechstein's work evidenced a lush and easily accessible sensuality. Kirchner, the sparkplug, displayed abrasive humanistic interests. Reverencing Whitman as well as Nietzsche, he later wrote, "I wanted to express the richness and the joy of living, to paint humanity at work and at play in its reactions and interreactions. To express love as well as hatred."

More widely known than *Die Brücke*, and of greater subsequent influence on American painting, was the group whose headquarters was in cosmopolitan Munich, and was known as *Der Blaue Reiter* (The Blue Rider). The leaders were Kandinsky and Franz Marc, a German, but the group also included another Russian, Alexey von Jawlensky, Gabriele Münter, Macke and Klee. The name came from *Der Blaue Reiter*, an almanac published in 1912 that contained articles by Kandinsky, Marc and others, as well as copious illustrations, not only of the group's own work, but also of its sources of inspiration, ranging from Matisse and Picasso to Bavarian folk art and Malayan sculpture.

Kandinsky had come from Moscow at the age of 30 in 1896. Already well versed in jurisprudence and anthropology, he studied art in Munich with a painter named Anton Azbé. In Azbé's studio he met Jawlensky, a nobleman who abandoned a military career to learn of painting first from Ilya Repin, the Russian realist, and later Matisse, leader of the Fauves in Paris. Under the stimulus of Fauvism, Jawlensky's still lifes and pictures of women erupted in cacophonies of color that melded Slavic barbarity with Gallic finesse.

Kandinsky, too, spent time in Paris, and felt the Fauvist magic; he began to paint more freely and with exuberant color. Marc, the son of a minor Munich genre painter, had been pursuing art in Munich, and discovering that "I felt the human form to be ugly from a very early stage, animals seemed to be more beautiful, purer. . . ." He sketched beasts at the zoo, and their bone structure in natural history museums. The catalyst came when he saw Kandinsky's works at a Munich group exhibition. Henceforth, Marc's cows and deer and horses charged across his canvases in fantastic hues that, to Marc, had symbolic overtones. "Blue is the male principle," he wrote, "astringent and spiritual. Yellow the female principle, gentle, gay and sensual. Red is matter, brutal and heavy."

Kandinsky also responded to the symbolic properties of color (though the values he assigned to each dif-

Staatsgalerie moderner Kunst, Munich

Heckel's *Girl Reclining*, in use of lyrical and simple forms, shows naturalness espoused by *Die Brücke*.

Schmidt-Rottluff's *Tower of St. Petri in Hamburg* displays dramatic use of bold forms and colors.

fered from Marc's). The Russian saw corollaries between color and music, believing that "a light blue is like a flute, a darker blue, a cello." Imbued with an Oriental sense of universality, he had delved into theosophy, the transcendental faith then being preached by Rudolf Steiner, and foresaw the coming of a new, more elevated era, with the artist as its herald. Seeking a transitional art form to guide Man toward a new age, he evolved a pictorial shorthand, based on fugitive images that suggest but do not fully identify a subject.

Better than most men, Kandinsky understood the power of ambiguity, and a work such as *Small Pleasures* (p. 94) can be read on many levels. The two diagonals at the lower left are Kandinsky's sign for a pair of lovers, while the elongated forms on the lower right are his notation for robed elders, and just over them, three sharp strokes projecting from a semicircle are his emblem for oars and a boat. At the center is a hill, with a Kremlin-city atop it, and above the city's towers to the left, sweeping lines offer clues to a horse and rider. But is it simply a sylvan idyll of fishing, loving, strolling and riding, or is the title to be taken more ironically, with the lovers conceived as the parents of mankind, the boat casting off for a more hazardous, spiritual voyage, the city a heavenly Jerusalem, and the rider a celestial artist, a mythic St. George, an apocalyptic horseman? Scholars disagree.

Der Blaue Reiter staged its first exhibition in a Munich gallery in December 1911. The show traveled to Berlin in March 1912. There it was enlarged to include the work of other Expressionists and a Viennese newcomer, Oskar Kokoschka.

Berlin had become a magnet for Expressionists of all kinds: not only Kokoschka, but also Nolde and *Die Brücke*, whose members had shifted from Dresden. Older artists and the hierarchies of officialdom were outraged by the new wave, but Berlin also had younger, more open-minded critics, adventurous dealers and a receptive public. The work of the Expressionists was praised and bought, even as the movement attracted new adherents and the painters became enmeshed with their literary and theatrical fellow-thinkers. Throughout the prewar years, the war, and the chaotic interregnum that succeeded the armistice, the Expressionists painted as never before, depicting the seething metropolis, its cabarets, its courtesans, its fat and pompous businessmen and generals, its confusion, isolation and alienation.

French Cubism, as a stylistic influence, affected the new renditions, lending to many a new sharpness and angularity. This may be seen in Kirchner's views of gaunt and gaudy floozies crossing busy streets, or his jagged, spooky vistas of urban architecture. One sees it, too, in the work of younger artists such as Grosz, a native Berliner who had studied the satires of Goya and Daumier before volunteering for the army in 1915, at the age of 22. Discharged, redrafted, sent to a sanatorium and finally invalided out, Grosz continued to limn the capital in bizarre and horrific visions of collapsing streets and disease-ridden lounge lizards. Kokoschka, the Austrian, divided his time between Vienna, Berlin and Switzerland, being particularly adept at psychologically intense portraits and demonic figure studies, such as the one of friends con-

Staatsgalerie Stuttgart

Color had symbolic meaning for Marc: blue, male; yellow, female; red, brutal. Here, *Small Blue Horses.*

Kunstsammlung Nordrhein-Westfalen, Düsseldorf

Beckmann's *The Night*, painted in 1918-19, was a nightmarish view of the terrors of the postwar era.

Solomon R. Guggenheim Museum, New York

Kandinsky devised script images to suggest themes. *Small Pleasures* includes a city on a hill (center).

gregating perhaps at his favorite nightspot, the Café Megalomania.

Max Beckmann was also discharged from the army; as a medical orderly, he had suffered wounds by the age of 31 which were more emotional than physical. A flour merchant's son who had studied painting at the conservative Weimar academy, Beckmann had already adopted a mode of large, ambitious compositions based on Italian Renaissance and French Gothic prototypes, but it was not until after his wartime ordeal that his paintings acquired their unique element of personal allegory, enhanced by a statuesque acerbity and a deeply disturbing impassiveness. *The Night* (above) with its sadistic story of thugs torturing a helpless man and wife, expresses as no other work may the loss and despair felt in Germany at war's end.

Marc and Macke had been killed in action. Kandinsky, as an enemy alien, had been forced to return to Russia, while Jawlensky had fled to Switzerland. Kirchner was also there, having undergone a nervous breakdown in the course of his military service. However, the period of the Weimar Republic, in the 1920s, proved fruitful from an artistic standpoint, with the emergence of "New Objectivity," together with the antic iconoclasm of Dada and the ultramodern elegance of the Bauhaus school of design (in which both Klee and Kandinsky played leading roles). Expressionism had indeed given birth to more than it knew.

Its practitioners continued to survive and produce even in later and more desperate years. Kirchner, to be sure, committed suicide in 1938 in Switzerland, partly because of Nazi persecution, but Beckmann and Grosz emigrated to the United States and enjoyed recognition and renown. Kandinsky died in France in 1944, and Beckmann in New York in 1950, but Grosz was to return to Germany after the war, and died in Berlin in 1959. Other Expressionists, who had been stripped of titles and teaching posts, had their work confiscated and destroyed, and had been forbidden to paint by the Nazis, were belatedly accorded new honors and jobs. Nolde, given a professorship by the Schleswig state government, survived to the ripe age of 88, dying in Seebüll in 1956. Kokoschka finally succumbed only last winter in Switzerland, at age 93.

It may be, as Thomas Messer maintains, that the Expressionists, no less than the Cubists and Fauvists, were reflecting and expressing "the final collapse of a whole sociopolitical order," the sane and ordered society of prewar Europe, so eloquently mirrored in the serene paintings of the Impressionists. New forces were undermining this society even before the war and, as Messer says, "One of the interesting aspects of the artists is to have antennae that sense somehow the end of an order before it occurs externally." Nevertheless, nature abhors a vacuum, and just as new institutions and balances of power have arisen to replace the old, so too the Expressionists and their contemporaries pioneered with a new kind of beauty, a fresh and intuitive language to represent a modern reality.

Kokoschka's portrait, *Herwarth Walden*, indicates dynamism of publisher of *Der Sturm* magazine.

Staatsgalerie Stuttgart

Gilded *ganjira*, Buddhist religious symbol, rests on roof corner of the Potala, historic palace

of Tibet's Dalai Lamas. Lhasa lies in valley of Kyichu River, surrounded by denuded hills.

By S. Dillon Ripley

Tibet: the high and fragile land behind the ranges

A stupendous example of mountain building, the country of the lamas is also an object lesson in maintenance of a vulnerable ecology

Tibet. The word has loomed in Western minds for centuries—remote, austere, a magical never-never land, accessible only in dreams. The spirit of restless mankind needs such abstractions, real or imagined. There should always be one farther place. So it has been with me since boyhood. By chance I grew up in a country town where the memory was still fresh of William W. Rockhill, author of *The Land of the Lamas*. He was a former State Department official, an Ambassador in the older tradition, who had mastered Chinese as a youth, read widely in the Buddhist religion, and traveled in the western reaches of the then Chinese Empire, dressed in native clothes. In his later years he was visited by lamas, apparitions in that Connecticut village. His library included the *Kanjur,* the main collection of Tibetan Buddhist scriptures, sacred books of lamaism, and Chinese and Sanskrit texts. It was one day to find its way into the Library of Congress. This was enough for me, and when at the age of 13 I was summering in Kashmir, my mother allowed my sister and me to walk into Ladakh for six weeks. I became imprinted, as behaviorists describe it, with the awesome grandeur and mystery of the "Roof of the World."

Tibet nowadays is an Autonomous Region of the People's Republic of China. The government is centered in Lhasa, with appointed administrators, both Chinese and Tibetan. This situation has evolved since 1959, when administration of Tibet under the Dalai Lama, his ministers and army, was taken over by the

Photographs by Mary Livingston Ripley

Towering over 17,200-foot Jago pass and its lone walker, these serried ranges, testaments to titanic forces of upthrust and buckling of the Earth's crust, lead off toward the cloud-draped Himalayas.

People's Republic after an uprising against the Chinese mission and occupying troops. The Dalai Lama fled to India, ending 600 years of theocratic rule.

As a student of the birds of Asia, I was asked to come to Beijing in the spring of 1980 to deliver a paper on the zoogeography of the Tibetan Plateau and to take part, with my wife, in a two-week field trip to Lhasa and across southern Tibet.

Nowadays you do not enter Tibet, if you are a foreigner, tourist or otherwise, by pony or yak caravan, not even by motor road, but rather by plane. If you wish to appreciate, all of a sudden, what it is that makes Tibet the dramatic geological wonder of the world, this is the way to start.

Flying in from China one sees clearly the evidence of orogeny, or mountain building, beginning in the middle Cretaceous Period, about 100 million years ago. Earlier, during much of the Mesozoic Era, Triassic and Jurassic Periods, 138 to 240 million years ago, southern Tibet was largely submerged below the northeastern reaches of the tropical Sea of Tethys, a huge expanse of water stretching between the continents of Eurasia and Gondwanaland—the latter a complicated land mass then consisting of South America, Africa, Antarctica, Australia, India and associated microcontinents and islands.

During the Cretaceous, 65 to 138 million years ago, the Indian subcontinent separated from Gondwana and began moving north across Tethys, colliding with Eurasia and forming the Himalayan range and the Tibet plateau.

What we were skimming over, only a few thousand feet above these ragged ridges, was the crumpled northeastern edge of the collision zone between Eurasia and the advancing segments of the Indian sub-continent. The impact between these continents folded Tethyian sediments and thrust them northward into east-west running mountain ranges, subsequently raising the vast plateau of south-central Asia. The final event, only a few million years ago, was the great uplift of the Himalayan Range, highest in the world.

From the air we soon saw mountains looming up, only names to us previously, as remote and mysterious as the passage of time itself. Suddenly, to the south of our plane, we had a vision of a lone white, shining massif, miles long, in the center of which a pointed central snow peak rose, gloriously clear and awesome in its majesty—Minya Konya, just under 25,000 feet high. This mountain was first climbed in 1932 (strangely enough, by an American team, a member of

Dillon Ripley and his wife have had a long interest in the birds of Asia, on which he is a leading authority. This was a first trip to Chinese Tibet.

Ascending Jago-La, well above tree line, travelers passed 20,000-foot peaks newly dusted with snow.

Such altitudes are hard on plants, animals. Those making trip had first to undergo rigorous physical.

which was ahead of me at school, Arthur Emmons—the only person I had known in my teens who had lost some toes from frostbite.)

Meanwhile, between the rows of ridges wreathed in snow, or stark with blackish or brownish rocks, we could see—deep, deep down—profound gorges, narrow, twisting, occasionally illuminated by the shine of water in the streams 10,000 feet below their crests. Our maps showed us we were flying high above the sources of the upper Yalong and Chang (Yangtse) rivers.

We skimmed on, our maps telling us that now we were crossing the gorge of the Mekong, alternately reddish and clay-colored, then the Salween, grayish green at the base of an unimaginable chasm, lined at the bottom with the darker green of forest. Next, high over all rose cloud-wreathed masses of exposed rock, interspersed with gleaming beds of snow, glaciers.

Below the snow the ridges were bare well above tree line; sometimes the crags were variegated, pale limestones, dark sandstones and basalts, with softer pastel strata between them. Sometimes there were flat ridge tops, buffed smooth—erosion peneplains, now deeply dissected, leaving only flat, smooth knobs at the crests of the steep ridges. Then came the next great peak, Namcha Barwa, the famous buffer, against which the Yarlong Zangbo (Tsangpo) River bends to churn southward and become the Brahmaputra.

To the south of us now reared the peaks of the main Himalayan range that we know from the other side, in the Kingdom of Bhutan—the Kula Kangri first, then the sharp clear white northern peak of Chomo Lhari, near the Bhutan-Sikkim-Tibet border, under whose shadow my wife and I had once camped (SMITHSONIAN, December 1973). Then the plane descended rapidly to the valley of the Yarlong Zangbo, and in a moment, or so it seemed to us, we were at the Lhasa airport, pedestrians again.

The air was magically clear, the sky burnished blue, the clouds, here and there, of purest white. Lhasa lies some 65 miles away. The road follows the Yarlong Zangbo upstream, then turns north at a junction with the smaller Kyichu River, crossing another new bridge. The first sight of Lhasa is the isolated limestone hill which lies in the narrow plain. On it sits the great palace-monastery, the Potala, former seat of the Dalai Lama.

Lhasa today has the appearance of a small city, with wide paved streets in the new part, sidewalks, traffic policemen, and even a traffic light at one of the main intersections. The streets are lined with shady trees, willows and poplars. The population must be in excess of 100,000, of which at least a third are Chinese. (The Tibetan Autonomous Region as a whole has 1,750,000 Tibetans, 130,000 Chinese in government

service, and at least 100,000 regular Chinese troops.)

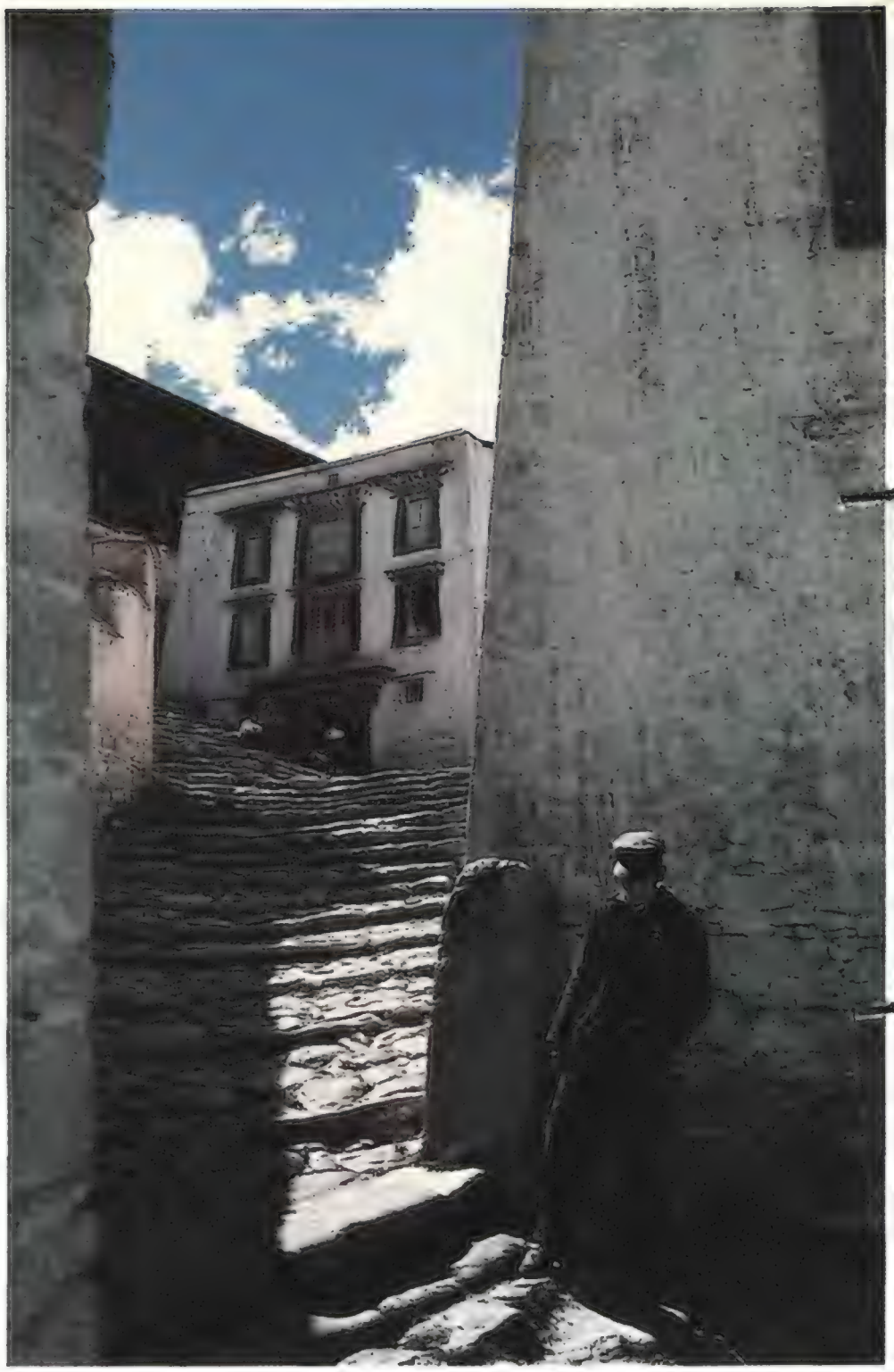
Passing the traffic light, we turned into a courtyard and found ourselves in the State Guest House, a roomy set of buildings with running water, electric light and a spacious dining hall. Here the members of our party were quartered during our stay in the capital. We numbered initially some 160 souls, foreigners from 17 nations, accompanying Chinese scientists, and guides employed by the Academia Sinica. Among us were several medical doctors, foreign and Chinese, who promptly urged us all to rest for the afternoon and adopt a regime of taking our pulses and recording our general physical conditions daily. We had all had to have medical tests, of heart and lungs particularly, before coming on this journey to the "Roof of the World," and to be sure one felt slowed up at an altitude of more than 12,000 feet. Our solicitous hosts provided large canvas bags of oxygen for every room, on whose plastic tubes we could suck when the need required.

Our first concentration in the days in Lhasa was with the city itself, the palaces and the nearby monasteries, for the spell of this hidden and inaccessible citadel of the Lamaist faith is contagious, no matter the changes wrought by time and political events.

The Potala (pp. 96-97), palace of a thousand shrines and rooms, still dominates the city, although the Dalai Lama lives in exile. It remains a brooding presence as indelible as the mountain ranges.

We wandered through the vast, dark, silent halls, filled with shrouded figures of the historical Buddha Sakyamuni, golden stupas of the successive Dalai Lamas and of King Songtsen Gampo, the seventh-century first ruler, who unified Tibet and married two foreign queens, a princess of Nepal and one of China.

The roof apartments of the Potala are light and airy by contrast. But what a prison this must have been for



At Drepung monastery, now museum, tapered window frames, carved entablatures show the Tibetan style.

Ubiquitous yak, here grazing on peat, provides food, fuel, shelter, clothes and labor for Tibetans.

Carved in rock on road south of Lhasa, Sakyamuni Buddha (right) blesses Earth with outstretched hand.

Wild flowers, such as *Stellera chamaejasme*, brighten gravel at high elevations, are missing from low.

a priestly ruler! Only on the roof was there light and air and sound, the feeling of life itself. Heinrich Harrer, in his book *Seven Years in Tibet*, writes of the young 14th Dalai Lama observing people from the roof with his telescope, a prisoner in his own palace, isolated by ritual and custom from normal human contacts. That the Dalai Lama survived as a person shows tremendous discipline and subjugation of self.

Another great site of Tibetan Buddhism is the central temple, or Jokhang, lying in the heart of the older part of Lhasa. It is still active as a temple, with Tibetans on pilgrimage and lamas in attendance. We visited the shrine, celebrated for its valuable and historic ornamentation, its figures of the Sakyamuni Buddha and the statues of King Songtsen Gampo and his two wives, and found it beautiful and moving. The temple was full of life, with lines of devout visitors, clouds of smoke from the yak-butter lamps, the smell of incense—all the vitality that was lacking in the other old buildings.

Gardening at 12,400 feet

On other days we visited the Dalai Lama's summer palace in the western park at Norbulingka, now maintained as a museum. The gardens still are well kept up and are an example of what care and attention can do to the landscape, even at 12,400 feet. So this valley must have looked a thousand years ago, the hills covered with green from trees and shrubs, before the vegetation was destroyed for firewood and prevented from regenerating through continual grazing by sheep and goats and cattle.

The one nearby monastery that we could visit, one of the three former citadels of monastic power, is Drepung, set in a small fold in the hillside five miles northwest of the city. Formerly home to 10,000 monks, the monastery stands virtually empty today. The shrines are well cared for, although conservation and restoration techniques being undertaken here and elsewhere made a museum man like myself shudder. The application of heavy varnish finishes seems to me to bode ill for the mural paintings by sealing in the inevitable moisture in these plastered walls. I foresee blistering and shredding away of the paintings in the long run. But the architecture is superb, and the feeling remains of a once-vital, living place.

In the following days we journeyed through the land, observing geological formations and plant and animal life. My own hopes of seeing many birds were dashed. It was disappointing to see such small numbers of individuals among the 60-odd species that we noted. Where earlier accounts (pre-World War II) spoke of large flocks of ruddy shelduck and the characteristic barheaded goose of the Tibetan Plateau, honk-

Sacred *chorten*, or reliquary, at Gyantse was built by local prince, at 100 feet is Tibet's tallest.

Jet of steam spurts from thermal spring northwest of Lhasa, once site of a historic monastery.

ing and cackling along the shores of the river, or of flocks of cranes and shorebirds at the great lake to the south of Lhasa, we saw fewer than a dozen geese at widely scattered locations in our 620-mile trip of more than ten days. Two pairs of ruddy shelduck had young, an encouraging sign, but all were wild as hawks. Similarly, shorebirds were lacking, except for a single ibisbill, a unique denizen of the Himalayas. A single redshank, a typical migrant sandpiper, perhaps represented a stray. Hawks were scattered and rare, and eagles almost nonexistent, although scavenging ravens seemed common enough near the towns. Larks and finches of perhaps ten species were all that we could find. The feeling persisted that we were seeing far fewer birds than we might have in years past. Pesticides used on crops in the irrigated valleys could have been part of the answer.

If the Tibetan Plateau is in a way the world's "third Polar region," as one of our Japanese colleagues put it, then there is a special meaning to what we perceived in the joint decline of vegetation and wildlife.

Where pilgrims enjoyed hot baths, springs are now tapped for electricity-generating experiments.

The plateau and mountains, with the outer southern range acting as a shield against monsoon-season moisture, form an environment of great hardship, one in which living organisms of all kinds must be near the limits of physiological tolerance.

In the past, the human population was bound by the ecologically favorable constraints of a theocratic government, in which 30 percent of the male population was celibate. Then there was the primitive state of medicine, leading to a high infant mortality rate as well as a relatively low life expectancy. All these factors together created an equilibrium between a limited human reproduction rate and an environment barely in balance. The loss of such built-in constraints, along with a recently arrived non-Buddhist population, conspires to upset the fragile balance of such a polar-like region.

With the increase in the non-Buddhist population, we noted air guns and firearms of all sorts being carried by people along the roadsides, an indication of miscellaneous pot-shooting at moving targets. Perhaps this also explained the marked absence of small mammals—hares, marmots and smaller rodents. We were told that the wild yak, wild ass and sheep, gazelles and antelope were found only a considerable distance to the north in the largely uninhabited mountains and deserts of the outer plateau region, which we could not visit. Finally, efforts to increase flocks and herds of domestic animals—sheep and goats, yaks and cattle—to meet the increase in the human population are bringing their inevitable toll in overgrazing, leading to more erosion and land degradation.

During our journey my wife collected insects. All the way from 12,000 to nearly 18,000 feet, as well as taking a great many photographs, she scouted out butterflies, moths, flies and a scorpion or two, along with centipedes and beetles.

A beetle with its own "antifreeze"

Among the beetles were specimens of a little-known type of carabid beetle. On the Jago-La at over 17,000 feet she found these creatures under stones on the dry, desertlike ground. They are bizarre little black beetles —wingless, with highly restricted range—which come out at night to feed on frozen insects found on ice and snow. Most curious of all, their systems contain an "antifreeze," a kind of glycerol, a synthesized alcohol found in their hemolymph, the circulating "blood" substance of insects.

Our travel took us some 60 miles northwest of Lhasa to a vast plain at nearly 15,000 feet, full of jets of steam (left), where an experimental tapping of thermal springs to be used for electrical power generation was being undertaken.

Leaving Lhasa, we motored west 198 miles in one day over dusty but well-laid gravel roads to Xigaze (Shigatse), the second city of Tibet. Our route took us over the Kamba-La, a pass of more than 15,700 feet, a barren ridge now devoid of the cairns, stupas and prayer flags once erected by the Tibetans on passes, with here and there a grazing yak amidst scudding clouds and mist. Spotted on the gravel were surprisingly large 2½-inch trumpet-shaped pink flowers, a species of *Incarvillea*. Among the stones were tiny yellow flower clumps, *Oreosolen*, with occasionally a minute pink *Androsace*, and a miniature pink gentian with a whitish heart. Alpine flowers, if we saw them, tended to occur only on these high ridges. Lower down were blue *Sophora* and orange-red *Caragana*.

The road descends rapidly to a long and dusty plain in which lie the towns of Gyantse and Xigaze. Crops, mostly winter wheat and barley, are possible here at an altitude of 13,000 feet. Willows and poplars line the irrigation ditches and straggle here and there in clumps near houses and the small streams.

Driving southwest from Xigaze, we passed hillsides of light-colored Cretaceous rock thrust up and highly folded by pressures of continental collision into up-and-down ribs at angles ranging to 90 degrees in a fantasy of contrasting colors and layers, like a marble cake made in a gigantic dough machine. Even the old river terraces from earlier times were tilted here, showing the successive uplift of the surrounding hills during the last four to five million years, especially near the beginning of the last glaciation, when it is estimated the whole plateau and associated mountains rose some 9,800 feet in perhaps a million years! Such upthrust continues today. The mountains are still rising at a rate of perhaps half a centimeter a year.

What this portends for such animal and plant distribution as we see at present is correlated with weather systems. Given the existence of annual monsoon rains coming from the southwest, it is easy to visualize that this stable system, confronted over centuries with a gradually rising wall of mountains, the Himalayan arc, eventually becomes less effective in the interior valleys and ranges. So the annual rainfall lessens, penetrating shorter distances inland over the ever-higher mountain chain. The cumulative result is the creation by physical means of interior desert conditions. There is human evidence for this. Petroglyphs, rock carvings along the Indus River valley in Ladakh to the west show stone-age hunters of two to three thousand years ago, with bows and arrows. And yet this area is desert today, far northeast of Kashmir.

As we drove south, heavy rains had already started landslides in the deep gorges through which the Chinese built the road into Nepal. It was said the road was blocked. What could be done? Two small bulldozers were alleged to be available between Nyalam and the Friendship Bridge on the Nepal border, over the Bote Kosi River far below. We would have to wait and hope. If the monsoon really broke, and traditionally it might after June 15, we would be forced to return by road to Lhasa and fly back to Chengdu and perhaps Beijing. As an alternative it seemed appallingly long, and expensive, too, for those who had made flight plans to return to Europe or America. Suddenly we were on the edge of the 20th century again, and professors, mindful of summer sessions and lecture schedules, found themselves reluctantly returning to reality.

As luck would have it, the work of gangs of laborers, assisted by the single bulldozer (as it turned out), managed to clear the road sufficiently so that our small vans and jeeps could maneuver between the fallen boulders. Hemlock, pine and silver fir, interspersed with bamboo and rhododendron, made a green curtain around us as we dodged those boulders on this narrow, twisting road hundreds of feet above a torrential stream.

As we left Tibet and the green grazing valleys of Nepal spread out before us, it seemed to me that the reality of those desolate uplands, the stark realism which they portray, encompasses the whole history of the world. From Permian marine crustal blocks, pushed northward thousands of meters and toppling into deep-sea Jurassic sediments, millions and millions of years apart in time, subsequently turned topsy-turvy, bottoms up—to the edges of forests a few thousands of years old. All this is a compacted vision of history, so stupendous as to defy the imagination. Whatever happens on these desolate uplands, the evidence of the rocks remains, enigmatic and undying.

Members of the party collect insects on Kamba-La. Search yielded overall about 1,000 specimens.

Ruins of first lama king's vast 13th-century fortress cascade down hillside at Shekar Dzong.

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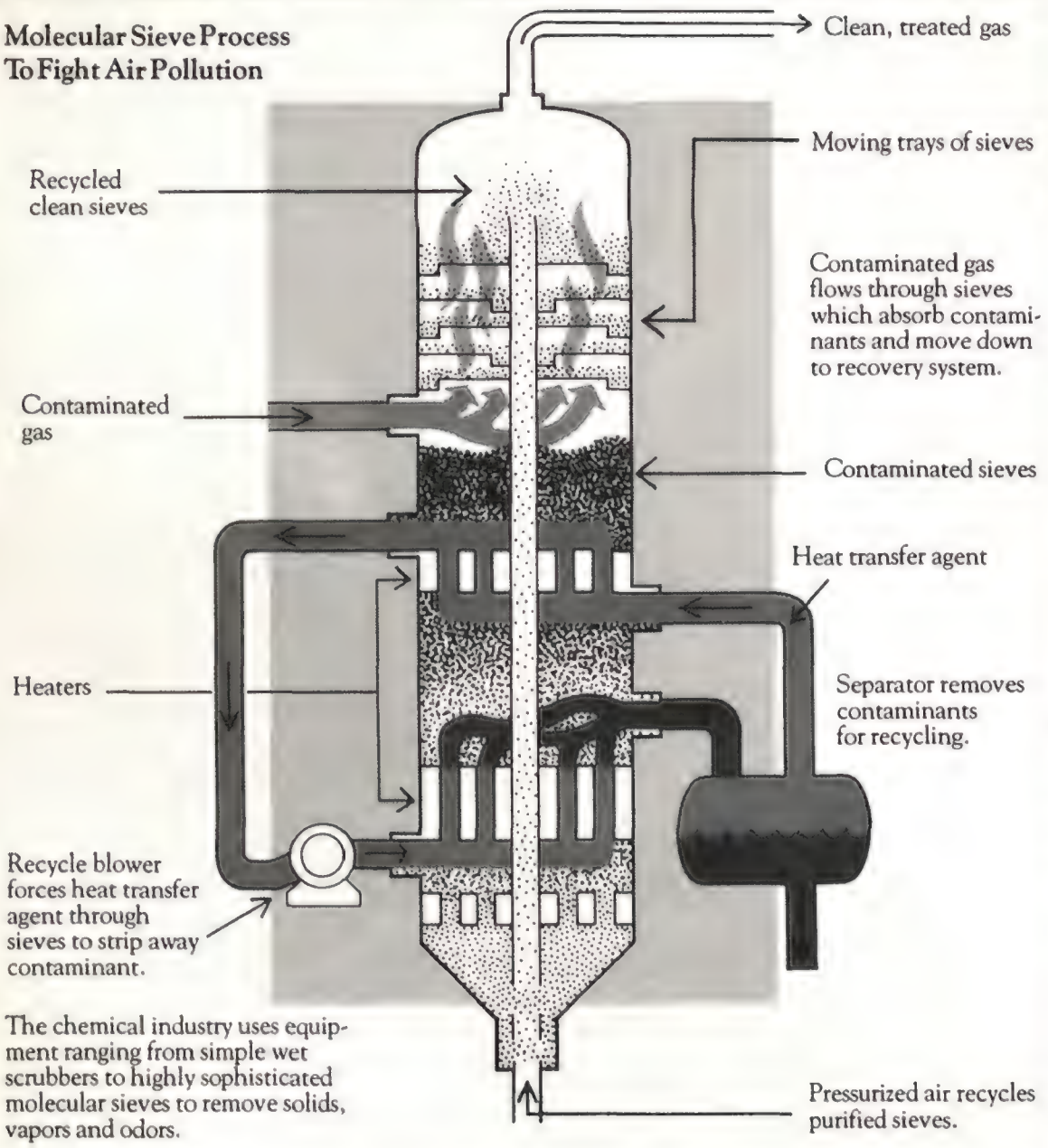
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By Jill Jonnes

To stay alive, big-city churches find new roles

Dwindling congregations and soaring fuel costs force old houses of worship to remodel or to rent—even to dancers

When the Jesuits dedicated Boston's magnificent St. Mary's Church on December 16, 1877, it was the crowning glory of an emerging social and political force—the Irish Catholics. A huge Romanesque brick structure (right) banded by pale granite and fronted by two stately towers, the church was a great lady presiding over the North End, a warren of dingy streets and tenements full of Irish immigrants.

Joyfully, they thronged their new church, filling its 2,000 seats, overflowing onto Thacher Street and marveling at the opulence—"the grand sweep of the auditorium towards the altars, the graceful columns, the soaring arches, the light, the color. . . ." The Irish of Boston looked on St. Mary's as theirs, and supported it generously. The new $200,000 church opened free of debt and St. Mary's claimed a parish of 20,000 souls.

Today, St. Mary's is no more. The plight of the urban church, whose tall spires and sturdy walls bespeak an earlier faith and the first commitment of settlers and immigrants, is a serious one everywhere. As congregations dwindle, as energy costs soar and as long-deferred maintenance can be put off no longer, many a city parish is facing a grim and uncertain future. Urban pastors of all faiths are all too familiar with the dilemma as the cityscape is slowly shorn of its spires, fine domes and old temples.

Gentrification is rescuing some churches, but others in the wake of St. Mary's are dying quietly and closing their doors, abandoning fine and distinguished buildings to the vagaries of vandals and arson-

On St. Patrick's Day 1977, wreckers began demolishing 100-year-old St. Mary's Church in Boston. In its place, the Jesuits have built housing.

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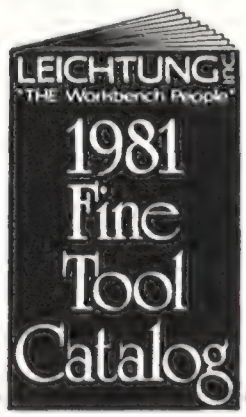

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ists or to the wrecker's ball. Many survive only by selling or renting to other religions, social agencies, theater troupes or whoever can help pay the bills. It is a heartbreaking and trying struggle in which congregations and lovely old buildings fall by the wayside, victims of changing times and mores. Others respond to the challenge with imagination and ingenuity and emerge stronger than before.

While many a despairing congregation —like St. Mary's—has to relinquish its building as an economic impossibility, those that aren't bought by other religions, or destroyed, are finding new lives as secular buildings, testaments to the alternatives to demolition. The Art Guild of Burlington, Iowa, has taken over the 112-year-old German Methodist Church for offices, workshop, gift shop and exhibition hall. A Unitarian Church in Atlanta is now the Abbey Restaurant, where customers dine under the original vaulted ceilings. The Bikur-Cholom Synagogue in Seattle is the Langston Hughes Cultural Center, with a day-care center and theater. The Gethsemane Lutheran Church in Austin, Texas, houses the publications department of the Texas Historical Commission. What was the sanctuary is used for meetings, socials, films and occasional weddings.

Most church groups, says Ann M. Beha, a young Boston architect and preservationist, have little sense of the significance of their buildings. "When they decide to sell the buildings, the congregations often don't realize that they may be landmarks. What they do with these buildings is tremendously important to the long-term health of the city."

Manhattan's new Citicorp Building has St. Peter's tucked in shadow of tower.

Father John Kelly of St. Mary's inspects Casa Maria with contractor.

When St. Bartholomew's Church in Manhattan announced last fall that it was considering a $100-million offer from a "very prestigious American corporation" for its landmark Byzantine church and property at 51st Street and Park Avenue, there was an uproar. Church officials decided not to sell the church, but said they might raze the neighboring vestry house to make room for a corporate high-rise. Mildred Schmertz, executive editor of *Architectural Record*, decried the prospect as sacrilege: "A beautiful man-made church is truly Godmade."

Back when St. Mary's parish dedicated its impressive church, the Irish already were being joined in the North End by a new immigrant group, the Italians. Other Catholic churches sprang up to serve the newcomers and slowly, as the Irish prospered, St. Mary's parishioners moved on to bigger homes and grassier suburbs. Many returned loyally for Mass, committee and project work, but St. Mary's—always viewed as an Irish church —had fewer constituents in the by-then tightly knit Italian North End. By 1972, the year St. Mary's closed its parish

HOW TO FOIL A CAR THIEF

A FEW SIMPLE PRECAUTIONS CAN REDUCE THE RISK OF THEFT

The numbers are staggering. Every 37 seconds or so a car is stolen somewhere in the U.S. That adds up to almost 800,000 cars a year. But you can do something to keep your car from becoming a statistic. Start by avoiding these four common parking mistakes.

The "Just for a Minute" Syndrome. When you leave your car, even if it's "just for a minute," lock all of the doors and take your keys. In fact, about one of every five cars stolen was left unattended with keys in the ignition. Keep driver's license and vehicle registration cards in your wallet or purse. If a car thief finds these documents in the vehicle's glove box, he can impersonate you if stopped by the police.

The Isolated Location. It's safest to park in a locked garage, but if you can't, don't leave your car in a dark, out-of-the-way spot. Instead, try to park on a busy, well-lighted street. Thieves shy away from tampering with a car if there's a high risk of being spotted.

The Display Case. There's nothing more inviting to a thief than expensive items lying in your car, in plain sight. If you lock these items in the trunk or glove box, there's less incentive for a thief to break in. Also, when you park in a commercial lot or garage, be cautious. Lock your valuables in the trunk, and leave only the ignition key with the attendant.

The Space at the End of the Block. In recent years, professional car-theft operations have become an increasing problem. Unlike amateurs, the professionals are not easily deterred. Cars parked at the end of a block are easy targets for the professional thief with a tow truck. So, it's best to park in the middle of the block. Be sure to turn your steering wheel sharply to one side or the other. That will lock the steering column and prevent the car from being towed from the rear.

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schools, fewer than a thousand worshippers came each week to the cavernous, ornate church. By 1975, the figure was 500 and services were moved to the smaller chapel downstairs.

So the Jesuits, faced with a moribund church, steep heating bills and no real prospects for a revival, began to ponder the plight of their grand old lady, now a bit battered. "It tears the heart out of you," sighs Father Frederick Bailey, 72 years old, his hair now as white as his clerical collar, "but what are you going to do? We got 225 people to Mass and we rarely got $225 in the collection. The last year, the fuel bill alone for a month was $2,000. People came up to me on the street and said, 'I was baptized there, I was married there; you can't close it, you can't tear it down.' But it was impossible to keep things going." No one could have had a stronger attachment than Father Bailey, who came to St. Mary's in 1943 and, with the exception of 16 years as a missionary in the Caroline Islands, worked there his entire priestly life.

The plan to tear down St. Mary's was immediately and fiercely opposed by preservationists and a determined group of neighbors. The battle was fought in the courts, the political backrooms, the press and on the streets, generated in part by genuine sorrow and love for the church, in part by racism and fear of outsiders moving in, and in part by the greed of some developers, who coveted the land.

After several years, on St. Patrick's Day of 1977, months short of its centennial, St. Mary's, mother church of the Jesuits in New England, fell to the wrecker's ball. A church built "not for the present alone, but for the future and its wants," was gone. It was a bad moment for everyone—for Father Bailey, who was convinced of the inevitable rightness of it, and for residents, who saw a part of their history and community dissolving into rubble before their eyes. The sorrow was laced with violence: In the first week of demolition, vandals struck every night. After attacking a high boom crane, they subsided, as if scared by their own ferocity.

In place of St. Mary's, Casa Maria

This year, the Casa Maria apartments for the elderly will be ready for occupancy. The six-story plain brick building is fully constructed and workmen can be heard banging away inside. Father Bailey operates out of a small chapel around the corner. Over Italian cookies and instant coffee, he shows me a cardboard box stuffed with file cards. "We have 398 applications for this housing and only 85 apartments, so it seems we are serving a neighborhood need," he says wryly. He has presided over a terribly painful rite, the demise of his own church, yet Casa Maria will be an integral part of the neighborhood in a way the church no longer was. He has no regrets.

St. Mary's was lucky in many ways, because it was able to guide its own demise and resurrection in an altered form. In great part, that was by virtue of its fortuitous alliances with a fledging consulting firm called The Cheswick Center and with the Greater Boston Community Development Organization. Some of the Center's first trustees were clergymen painfully familiar with the problems of underused, costly church property.

Dr. Henry Sherrill, Cheswick's director and a former executive officer of the Episcopal Diocese of Ohio, had watched climbing maintenance and fuel costs become a major burden in his own diocese. He says: "The Cheswick Center's first

In its deal with Citicorp, St. Peter's Lutheran Church got a new home.

The author works for a newsmagazine in New York, and also free-lances.

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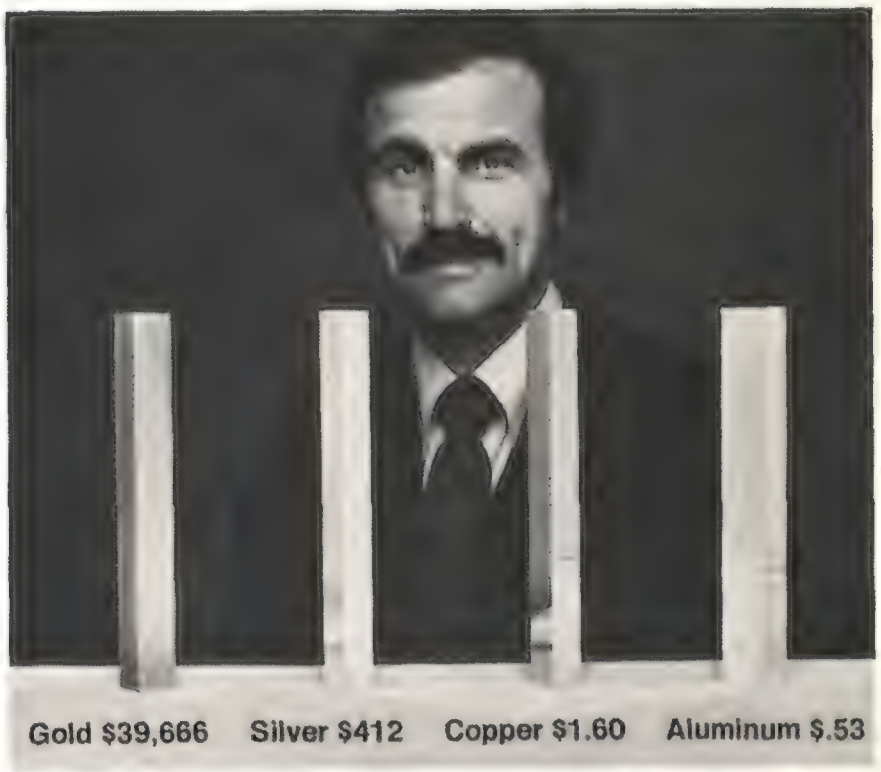

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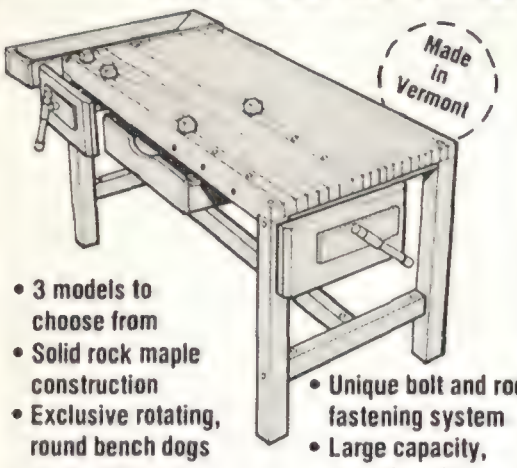

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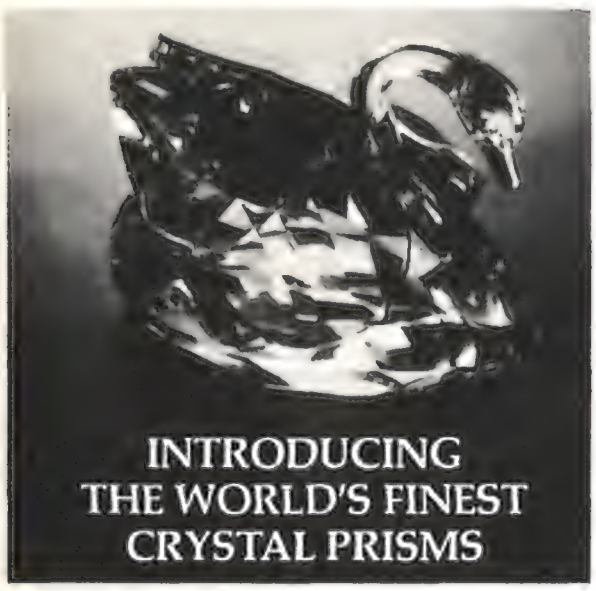

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Problem: First Baptist in Cambridge saw its attendance drop to some 70 souls.

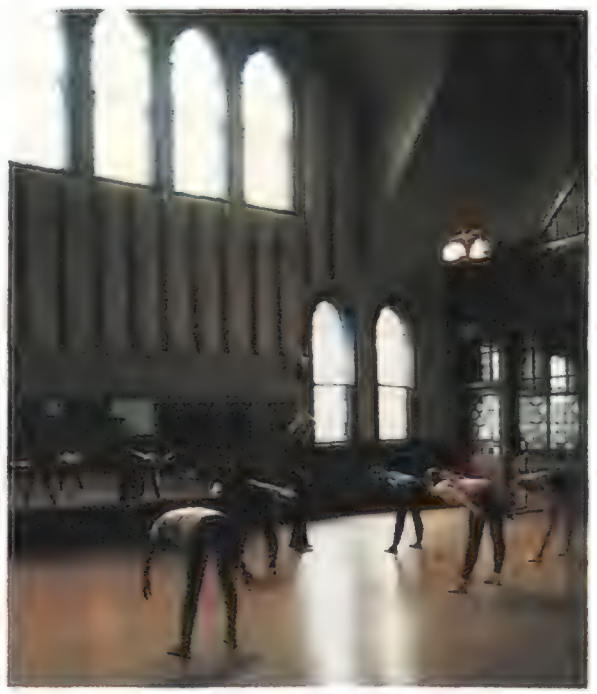
and most successful foray into the problems of underused or surplus church properties was St. Mary's, and the experience underscored just how emotional and complex the issue is."

On his own, Dr. Sherrill earlier had helped St. Peter's Lutheran Church in Manhattan parlay a prime site on Lexington Avenue into a $9 million deal with Citibank that gave the church a spectacular new home (p. 110) in the shadow of the Citicorp building, and a rejuvenated urban mission. The unique circumstances of that success made it appealing, but not very relevant to most churches. It was the Cheswick's discouraging discovery, in a survey of Boston churches, that church boards were most reluctant to face the problem of underused or empty properties.

Even when the signs of decline were obvious—an older congregation, dropping attendance, more and more of the budget going to the buildings—many were unwilling to act. "Some churches spend all their energy figuring out how to hold onto their buildings, and at a certain point that becomes a destructive force. All the energy that should be going into the spiritual mission is sidetracked," says Thomas Savage, a young Jesuit on the Center's staff. Churches, inherently conservative, backed off from the issue. After several years and half a dozen projects, the Cheswick Center did too.

"Our experiences with working with religious institutions on the governance problem is generally a dismal one," says Dr. Sherrill. "I don't think the institutional church has the capacity, the resources or the management to deal with this problem."

Sometimes churches simply need the fresh vision of outsiders. Not long ago the First Baptist Church in Cambridge, a massive red-brick Gothic Revival building whose 160-foot spire rises far above the traffic and congestion of surrounding Central Square, perfectly fit the profile of a doomed church in a declining neighborhood. In the mid-Sixties, this towering Victorian edifice came perilously close to being demolished and replaced by a high-rise apartment. It survived only because the small and mature congregation was too attached to its church. They could not toll the death knell for a house of worship where they had crowded as youngsters, proclaimed their wedding



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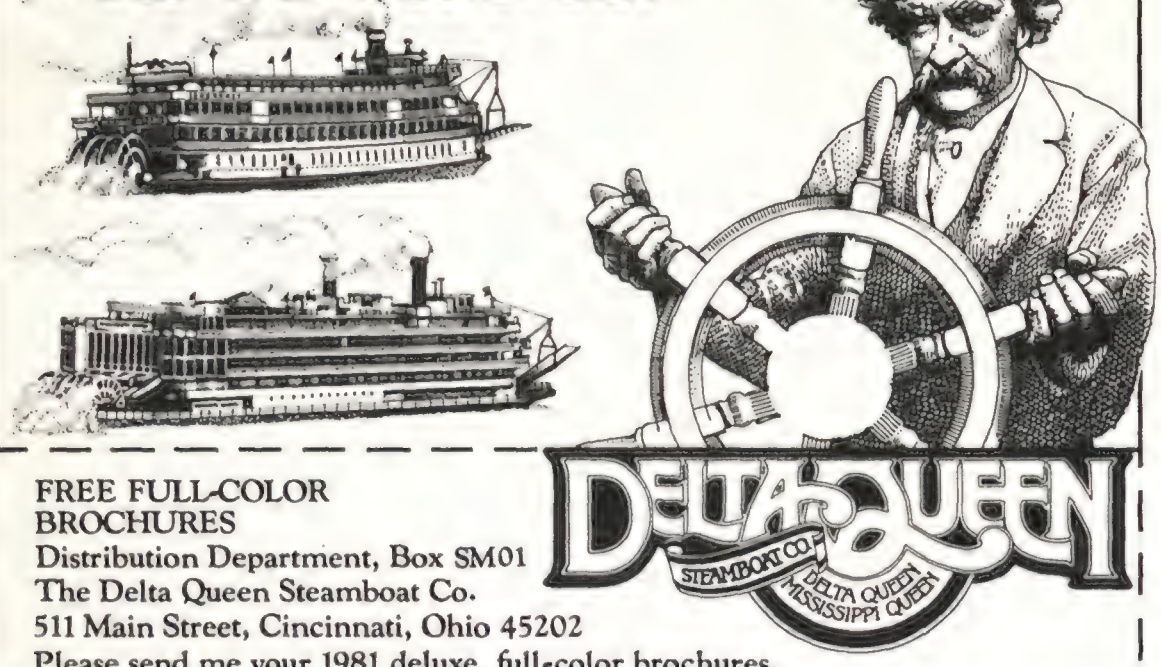

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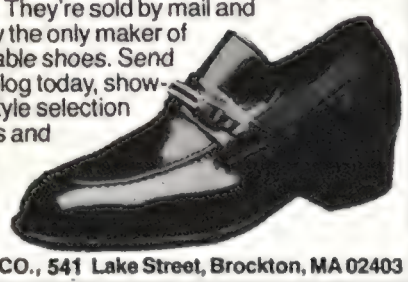

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Reminder: a First Baptist collection was earmarked to pay church fuel bills.

vows and then brought their own children. "When I was a boy," reminisced Deacon Eldon Urquhart, "you had to come half an hour or more early on Sundays if you wanted to sit downstairs. We had easily 1,200 people every week." But as more and more of the congregation moved to the suburbs, those who stayed could no longer support the huge church.

Finally, in 1975, as the situation became critical, the pastor got in touch with Ann Beha, then a young MIT graduate student in architecture, because he thought the heavy wooden front doors to the church might be discouraging newcomers from venturing in. What she saw was a landmark church in serious trouble —very poorly maintained, barely used and full of potential. The huge sanctuary, with its soaring vaulted ceiling and rose window, was leaking badly in spots. The gentle luminosity of the pastel stained glass was smothered under years of grime, and in winter the congregation could not afford to heat the sanctuary. The spacious ell, with its hardwood floors and ingenious system of triple-hung stained-glass interior windows that come up or down to divide the rooms, was rarely used.

"When Ann Beha came we were in serious difficulty," says Deacon Urquhart. "It seemed the church wouldn't be able to survive much longer and the congregation was decreasing. We had thought about combining with another church, but most of the members didn't want to do that if they had to give up our church. We thought about going with the 40-story-apartment-building idea and tearing down the building, but we just couldn't do that. The only way we made progress was when we really got down to brass tacks."

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Father Leo Murray outside Center Stage, at Baltimore complex that once housed St. Ignatius—down to about 150 members when it made room for theater.

The arrival of Ann Beha brought to the congregation a whole world of outside planners, concern and advice, including the Cheswick Center. "I was able to show First Baptist that their building was important to the city of Cambridge and that there were funds available for preservation," says Miss Beha. "There were meetings with the Cambridge Historical Commission, city planners and city councillors to talk about available grants for restoration and also reuse of the building. I tried to free up the associations they had with each space, so they could see that a parlor or dining room could as easily be an office or a meeting space."

Slowly, the congregation began to realize that its beloved church need not be a millstone. It required extensive rehabilitation, but by being listed in the National Register of Historic Places, the church was eligible for matching government grants for exterior preservation. Miss Beha obtained landmark status and $50,000 worth of government funds toward the total $120,000 cost for restoration. Sale of the parsonage brought another $40,000. As the work went forward over a two-year period, the congregation debated what they should do with the large amounts of virtually unused space in the two-story ell behind the sanctuary.

Miss Beha urged them to rent and turn their white elephant into a resource. Opening their church to strangers was not easy for First Baptist, but the income it would generate was desperately needed. "We asked them, were they ready to take in people who had nothing to do with the church," remembers Tom Savage of the Cheswick Center.

The answer was a reluctant yes. Miss Beha found two dance companies that needed space, and the Baptists, overcoming strong reservations about dancing on church premises, and stipulating that the sanctuary should never be used for other than religious purposes, agreed. Those rents now cover the church's basic fuel and electric bills, while the muffled tinkle of the piano and the daily comings and goings of young dance students imbue the buildings with a sense of vitality (p. 112). Some members of the congregation were saddened to lose use of rooms to people whose purpose is purely secular, but it has freed the congregation from an oppressive economic burden.

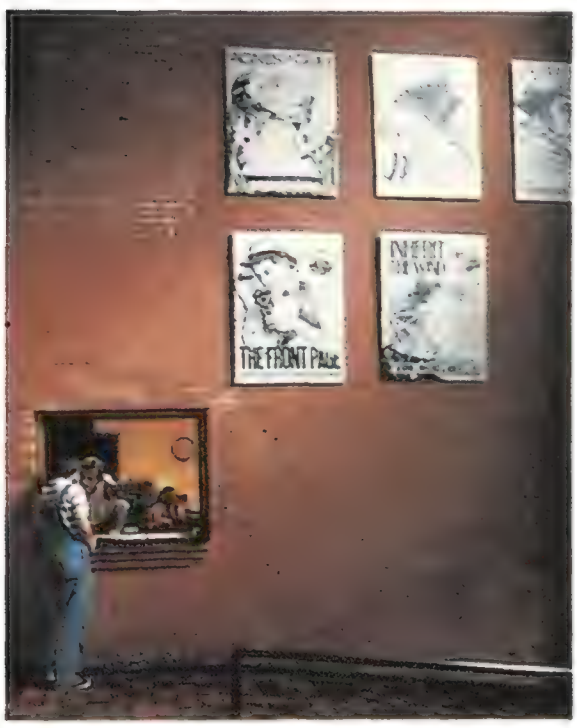
Ann Beha wrote her master's thesis on the process of restoring the church and went on to form her own architectural firm specializing in renovation, preserva-

tion and reuse of old buildings, including churches. "One of the problems so often with churches," she says, "is that the buildings are so large and so different from people's own homes that congregations get overwhelmed and decide their buildings are beyond repair when they really haven't taken a businesslike look at what needs to be done."

The story of St. Ignatius in Baltimore illustrates how profoundly a church can influence its own neighborhood by innovative reuse of its buildings, and then share in the renaissance. By the late 1960s, the future looked bleak for the handsome blocklong complex of federal brick buildings that once housed Loyola College at one end. The rectory had had to be evacuated because it failed the city's building code inspection; the empty school (it had moved to the suburbs) was a target of vandalism and the congregation of the large church at the far end of the block was down to 150 people. "We were about to tear down the whole block," says Father Anthony J. Zeits, treasurer of the Maryland Province of the Society of Jesus. "We had tried to sell it for five or six years, but no one wanted it because it just wasn't feasible for apartments or office space. It was just depressing for the parish to have this huge empty building there. So we were seriously considering demolishing the whole block and making it a parking lot."

Then Center Stage, a highly respected Baltimore theater group, lost its playhouse in a fire January 9, 1974. Their misfortune proved St. Ignatius' salvation. The abandoned auditorium-gymnasium exactly suited the requirements of Center Stage, which approached the Jesuits. Center Stage eventually got the building free. "The fire was really the making of us," says Center Stage managing director Peter W. Culman. "Every theater person who comes here is green with envy and the theater just knocks their socks off."

The colorful banners of Center Stage, its elegant marquee, and a new restaurant in the theater's half of the rectory attest to the block's new identity and life. The Jesuits have moved back into their part of the rectory, using it as a base for social services and other ministries. "People who have not been here in two or three years are amazed at how it's changed," says Father Leo Murray, current pastor of St. Ignatius. "It's a very exciting time. Some people didn't even know we were here before, but we're getting to be known for our liturgy and choir and we have many young people now at services."



The box office at Center Stage, which was burned out of its former home.

A church becomes a hospice

The Luther Place Memorial Church in Washington, D.C., which faced a depressing future a decade ago, also has been revived by imaginative reuse of its property. Built in 1873 as a post-Civil War memorial to peace and unity, the church is a rich red sandstone with a tall steeple in a heavy stone tower. Behind is a parish house and across on N Street a group of town houses owned by the church. The neighborhood, a few blocks from the White House, is, its pastor says, "a mixture of the good, the bad and the ugly." Side-by-side with high-rise apartments, offices and modern hotels, there is crime and poverty. On the church's front lawn, a copper-green statue of Martin Luther overlooks Thomas Circle, where prostitutes hustle passing cars and pedestrians day and night.

The exodus to the suburbs, the angry social movements of the Sixties that enveloped the church, and the rising crime rate all sapped Luther Place's white, middle-class congregation, and by the early 1970s the church was agonizing over its role and future. The congregation considered tearing down the town houses on N Street, all kinds of land-use schemes and even gave fleeting consideration to

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Architect Ann Beha helped guide the Cambridge church to financial way out.

demolishing the church and building a large skyscraper with church and offices incorporated. Yet ultimately, the antidote to the church's decline came from within —in the person of Luther Place's dedicated minister, John E. Steinbruck (right). A tall man with a salt-and-pepper goatee and piercing eyes, he has galvanized Luther Place with his energy and ideas—although he gives most of the credit to the congregation. "The thing that enabled the church to become the force it is now," says Hazel Stiebeling, a member for 50 years, "was the decision of the congregation to use its property not for rentals, but as a basis for service to the community. Pastor Steinbruck has an unusual sensibility that got likeminded groups to coalesce to do this, because no single congregation could do it alone." Rather than survive despite the surrounding poverty and crime, the church has sought out the dispossessed. "The simple concept we seized on is hospice," says Steinbruck, "to be a refuge, an oasis in the urban desert."

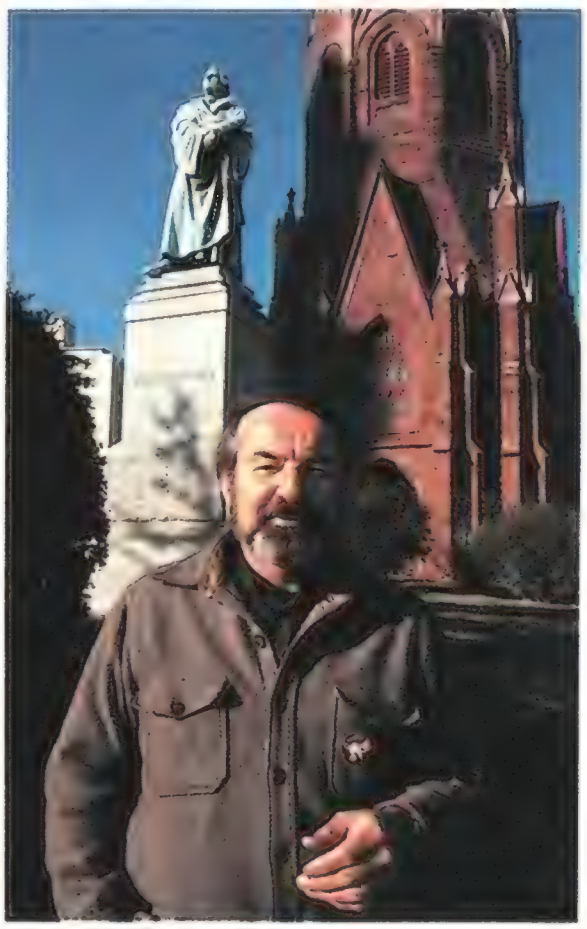
Luther Place took its town houses, parsonage and space in the church and offered them as "a basis, an anchor" to provide food, clothes, shelter and medical services to the "invisible people, the modern leper colonies," says Steinbruck. He quotes Matthew: " 'I was hungry and you fed me, thirsty and you clothed me; I was sick and you took care of me, in prison and you visited me.' We try to live those words here at Luther Place. It's hospice and it's very simple and extremely profound." The thriving urban ministry is run by an enthusiastic mélange of Lutheran students, Mennonites, Roman Catholics and parishioners.

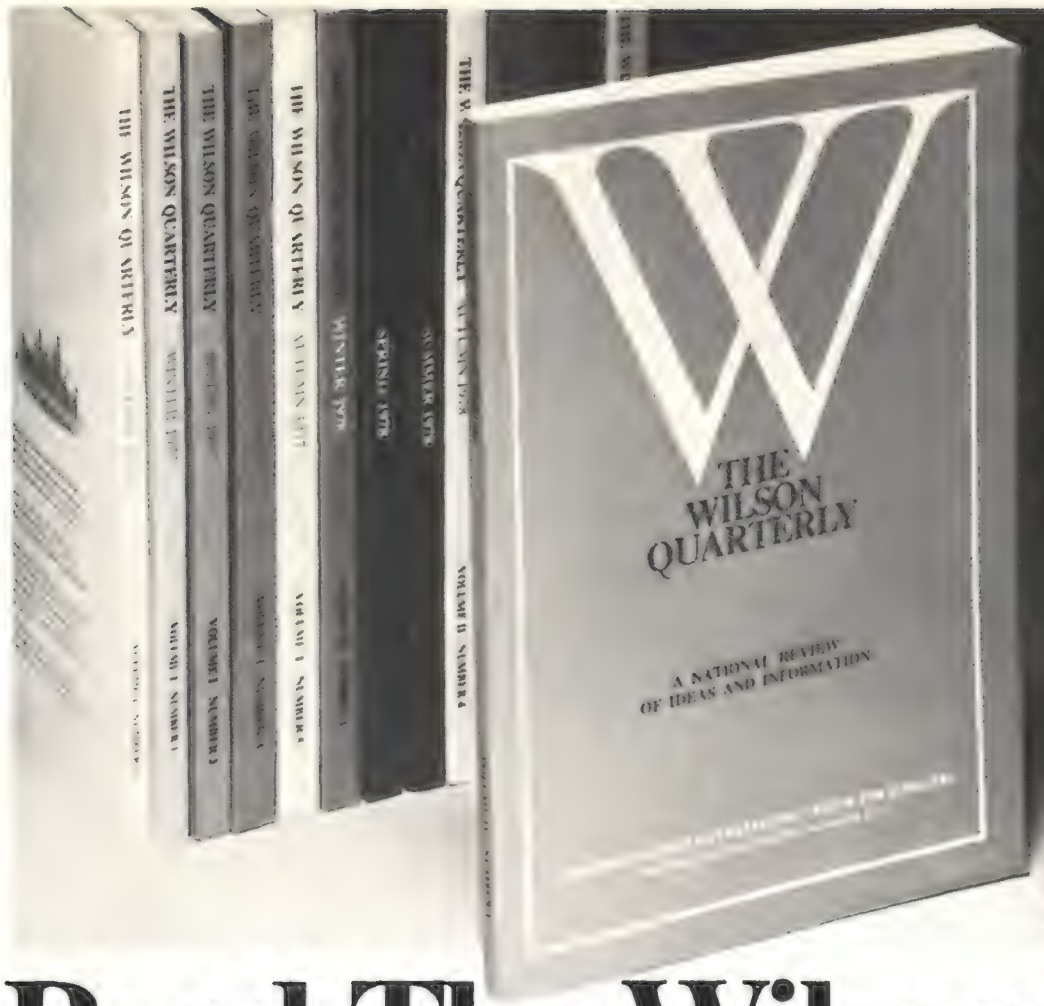
But most failing churches will not have the good fortune to be rescued by innovative pastors or homeless theater companies. So, as more and more churches are abandoned, we might do well to establish a system patterned on the English solution—an Advisory Board for Redundant Churches that decides the fate of old churches no longer used for worship.

The advisory board reviews surplus churches and then advises whether the church is worth saving for its architectural or historical value. If a church is recommended for preservation, but no alternative use can be found after three years, the board again considers demolition. If the church in question is particularly lovely or historically unique, the Redundant Churches Fund assumes financial responsibility and preserves the building on its own.

There is something poignant about the destruction of a church. It signifies the end of a time, an era, a devotion translated into stone or wood. As Wordsworth wrote about the King's College Chapel: "They dreamt not of a perishable home Who thus could build."

John Steinbruck has made his Luther Place Church into Washington "hospice."





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Book reviews

The World of Farley Mowat: A Selection from His Works
Edited and with an introduction by Peter Davison
Atlantic-Little, Brown, $12.95

Farley Mowat is the kind of naturalist who sets off for the Arctic only to find that both ends of his collapsible canoe have been shipped to a rattlesnake researcher in the desert. He is the kind of sailor who buys a boat that threatens to scuttle itself when it leaves shore. He is the kind of adventurer who will eat mice marinated in ethyl alcohol to prove that wolves can survive on a diet of rodents.

And Farley Mowat is the kind of writer who describes such enterprises with gusto and hilarity, yet with a chilling sense of the danger and the brutality that lurk in the sea, in the Arctic barren lands, in wolf country.

Mowat is an institution in Canada. He has produced 25 books, most of them gripping, many of them funny, all of them informative. His work has given Canadians an introduction to the more unfamiliar aspects of Man and nature in their strange, vast, frontier country.

The World of Farley Mowat is an introduction to his writing. It is a medley of short excerpts from 13 of his best endeavors. The excerpts are hors d'oeuvres, honing the appetite for the rest of his work, unabridged. With luck, this collection may help make him as well known in the United States, which speaks the same language, as he now is north of the border.

The North is his territory. The Eskimos have more than 100 words for various types of snow and Mowat seems to have 100 ways of describing it, from "the invitation that glows ephemeral on a woman's lashes on a winter night" to a "Master Titan" that "scoured the darkness like a blast of sand until no living thing could face it."

Morsels from Mowat's northern works tell of life in the snow—of "the stark utility of death" when hungry hunters decimate a herd of deer, of the almost unbelievable squalor of an Eskimo meal (Mowat's snacks of marinated mice are the epitome of refinement by comparison), of drinking champagne with Siberian reindeer herders, of the terrible survival of an Eskimo woman in a winter of starvation and official blundering.

Survival is the theme of much of Mowat's writing. Survival and endurance. The survivors are usually people who live in tune with nature. "Like sailing ships," says Mowat, "they learn to move with wind and water; to mold themselves to the rhythm of the elements and so accomplish gently and without strain the things that must be done."

Not always gently and without strain. In *The Grey Seas Under,* salvage sailors shinny up a rope coated in freezing slush to rescue the crippled remains of a U.S. Liberty ship, ripped in half by a storm during a World War II convoy. Towing the hulk to shelter takes a week through a nor'east gale.

In *The Boat Who Wouldn't Float,* Mowat's own schooner—built by a Mr. Enarchos Coffin in a place called Muddy Hole and held together by fish slime—is saved from sinking only by running aground after frantic hours of pumping. She winds up moored beneath the sewage pipe of a cod-oil factory, gradually filling with fish offal.

Mowat's output, which ranges from children's tales to military memoirs, is largely autobiographical. "I've been misled into believing that if you don't write novels you're not a writer," he told an interviewer a couple of years ago. "I'm not a novelist." He doesn't need to be.
—David Lancashire
The Globe and Mail, Toronto

Animal Days
Desmond Morris
(William Morris, $10.95)

For years, Desmond Morris has been struggling with himself, trying to reconcile the cautious zoologist with the flashy

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popularizer and entertainer. His earlier popular books, *The Naked Ape* and *The Human Zoo,* while drawing upon Morris' vast zoological experience, first as a student of Niko Tinbergen and later as Curator of Mammals at the London Zoo, examined numerous parallels between animal and human behavior. These works were highly regarded by the public, but met with varying degrees of skepticism from "establishment zoologists." The rigorous, laborious and often boring scientific method had not been uniformly applied to these findings and hence many conclusions were viewed as, at best, premature. His newest work, *Animal Days,* is part autobiography and part confession, and is thoroughly enjoyable. No heavy theories here, no glib interphyletic comparisons, but an engaging compilation of stories that only Morris could tell. Ethologists will appreciate his insights into Tinbergen's methodical nature, the bawdy limericks of Konrad Lorenz and Julian Huxley, and two hilarious tales of Lorenz's "errors of judgment." Unforgettable is Morris' description of the giant working model of the Fink, Fink, and Smith Psychohydraulic Machine, designed in 1952 to demonstrate, with colored liquids and obscenely dangling balloons, every popular ethological theory then in vogue.

The book also contains some of the perceptive descriptions of animal behavior for which the author was recognized in the 1950s and 1960s: supernormal stimuli, courtship in zebra finches, roosting in Java sparrows, and so on. At times, Morris lapses into some uncritical interpretations (for which, some say, he became well-known in the 1970s), such as that of "delayed revenge" in his television-star chimp, Congo. One feels sure that the methodical Tinbergen would not approve of such interpretations, which, in any case, are rare in this book.

Morris' lifelong romance with modern art is also very much present throughout *Animal Days.* It was a source of great frustration to him that his gallery exhibit of Congo's paintings was taken by many as a mockery of the art form he loves. Yet Congo's spatially organized work has been praised and honored by such artists as Miró, Picasso and Dali, and led Julian Huxley to a consideration of the possible evolution of an esthetic sense in animals and Man: surely a worthwhile, if speculative, venture.

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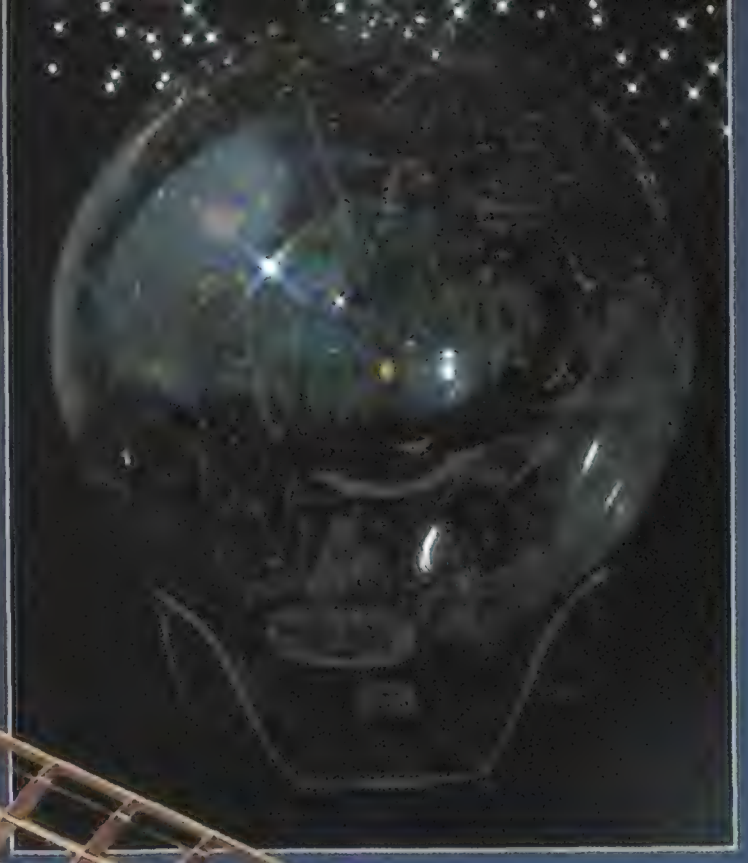

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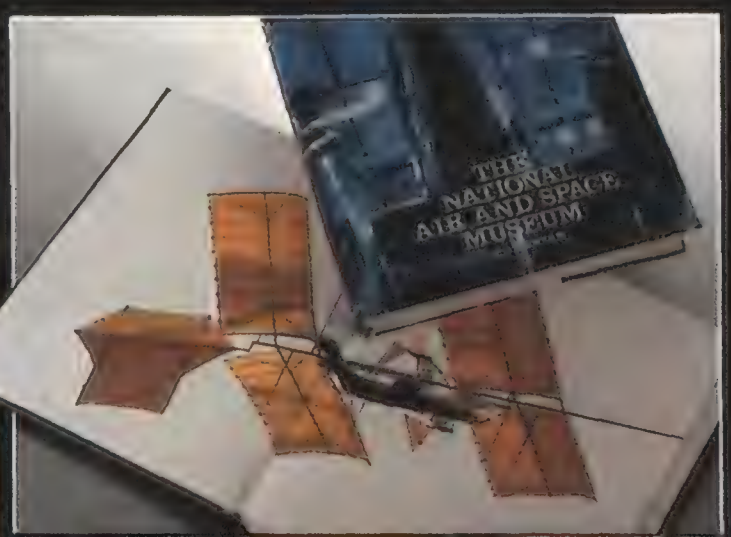

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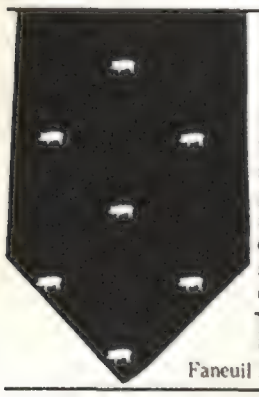

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After leaving the London Zoo in 1967, Morris became the Director of the Institute of Contemporary Arts, a fact that enraged many jealous artists (yet Picasso reacted with, *"Ah! Quelle bonne idée!"*). So Morris' career has been a checkered but productive one, straddling the interests of both zoologists and artists, yet never fully accepted by either group. He has, however, never failed to stimulate. *Animal Days* helps us to understand his own background and perspective while providing an interesting chapter in the history of European ethology.

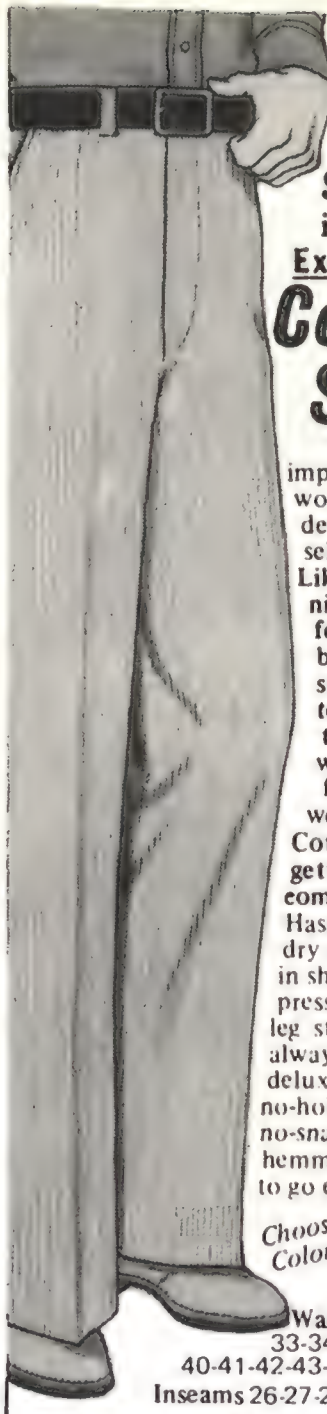
—*James A. Cohen*
Behavioral ecologist

They Tried To Cut It All
Edwin Van Syckle
(Friends of the Aberdeen Public Library, $17.95)

The Quinault and the Chehalis Indians had known it and fished it for centuries, but the American sea captain Robert Gray "discovered" it for whites in 1792: one of the few inlets of the Pacific, lying at north latitude 46-47 degrees. (Of course Gray had other claims to fame, as discoverer of the Columbia River and as the first American to circumnavigate the globe.) Grays Harbor, no apostrophe, has borne his name ever since.

This book has little to say about Captain Gray or about David Douglas, the young Scottish botanist who made his painful way (a rusty nail had pierced his knee) through the region in 1825. It has much to say about the gigantic tree that bears *his* name—the Douglas fir, or Douglas tree—and much more about the loggers who came from all over the world to cut down the firs and shape them for millions of houses and thousands of ships.

Their assault on one of the world's vastest stands of timber—one-and-a-quarter million acres of it, crowded with trees a dozen linked men could not embrace, straight and limbless for 100 feet up and more—lasted for about a century. It began with hand-logging of the easier, waterside trees that could simply be plopped into adjacent rivers or bays. It progressed to logging with bull teams, to logging with the mighty Dolbeer donkey engines that hauled themselves through the woods with steel cables looped around thick stumps, then to "high-lead" logging with spar trees, to railroad logging, and ultimately to the use of helicopters.



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And when it was all over, they looked back on the land they had leveled and found that they hadn't cut it all after all; the second-growth timber was catching up.

They are all memorialized here, the legendary ones, the timber tycoons and the nameless legions who labored in the woods (where a falling limb was aptly named a "widow-maker"), behind the ingenious splash dams that held back logs until a freshet sent them thundering downstream, in the ponds, in the deafening sawmills and on the shipways. Not to mention their women, about whom Van Syckle is strangely reticent.

The most colorful men of Aberdeen and its sister town of Hoquiam were, naturally, the notorious no-goods like "Fightin' Billy" McCabe, a Brooklyn-born brawler who was shot "clean through" the ribs in fleeing one of his innumerable street fights in 1907, but who lived on for 50 years, and "got religion" toward the end. Or Billy Gohl, Sailors

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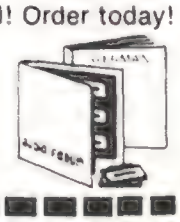

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Union agent who terrorized the Aberdeen waterfront, got away with murder for years, finally went to prison and died there insane.

A good question: at a time when many look on libraries as a prime target for budget cutting and many of the institutions seem friendless, how come the Friends of the Aberdeen Public Library can afford to publish this rich and richly illustrated book? The answer is named Henry Neff Anderson III, nicknamed Heine, a third-generation lumberman. As a friend of the library and of the author, he offered to underwrite the book, and did. The world and its libraries could use many more Heine Andersons.

—Richard L. Williams
Board of Editors, author of *The Loggers*

The Panda's Thumb: More Reflections in Natural History
Stephen Jay Gould
(W. W. Norton, $12.95)

The very fact that Stephen Jay Gould does something almost unique—that is, he writes literate and humane essays on scientific subjects—has condemned him to the small, unjust irony of being routinely compared, in reviews and by word of mouth, with those few other writers who do roughly the same thing. Most often the comparison is with Lewis Thomas (SMITHSONIAN, April 1980). It might be useful and tonic, then, to begin here by noting, very briefly, how *The Panda's Thumb*, a collection of Gould's regular columns from *Natural History* magazine, is *different* from, say, *The Medusa and the Snail.*

Lewis Thomas is a fine, elegant stylist but he never seems to offer us more than a fraction of the full wattage of his brain, nor a glimpse at the substance of his scientific work. Gould does. These new essays, besides being well written and entertaining, are given direction by Gould's guiding concern: to explore the history of life on this planet in the light of that majestic field known as evolutionary theory.

Gould has resolved that he "would not tell the fascinating tales of nature merely for their own sake. I would tie any particular story to a general principle of evolutionary theory: pandas and sea turtles to imperfection as the proof of evolution, magnetic bacteria to principles of scaling, mites that eat their mother from inside to Fisher's theory of sex ratio." And mainly he has kept that resolution, with a few

confessed lapses. For instance, the story of the Mauritian *Calvaria* tree, languishing 300 years after the extinction of its proposed mutualistic partner, the dodo, is one that, however meager its contribution to theory, we wouldn't want to have missed. This collection is rich both in bizarre biological facts, and in the ideas that make sense of those facts.

In his prologue Gould quotes Pliny to the effect that "Nature is to be found in her entirety nowhere more than in her smallest creatures," and that aptly describes the book's program. Through the distinctive quirks of magnetic bacteria and miniaturized flatworms, Gould stalks the meaning of nature in her entirety. He has, like a good novelist, the knack for harvesting broad insight from particularity. And not just bacteria and flatworms, not just pandas and mites and dodoes, but the Philippine anglerfish (which trolls an exquisite artificial-fish lure from the tip of its snout), the anatomical evolution of Mickey Mouse, the extinct marsupials of South America—all these oddities and others Gould converts lighthandedly to his pedagogic purpose.

Bit by bit, he shows us not only that the theory of natural selection is more complex and intricate than we had supposed, not only that it is still being elaborated by ingenious work throughout the world, but—greater accomplishment—that the theory is a joy to contemplate.

"I am a tradesman, not a polymath," he says, but be not deceived. His trade is the teaching of evolutionary biology, and he plies it well through these essays, which reflect as well his broad learning, broad interests, good humor. He cites Immanuel Kant and Lytton Strachey, quotes to the point from George Eliot and Muhammad Ali, writes fascinating revisionist history (in the best sense) on the Piltdown hoax, then tells us of the time, when he was five, that his father took him to see the museum's *Tyrannosaurus,* and he decided he would be a paleontologist.

Or another example, concerning precisely repeated songs of the humpback whale: "No scientific fact that I have learned in the last decade struck me with more force than Roger S. Payne's report that the length of some songs may extend for more than half an hour. I have never been able to memorize the five-minute first *Kyrie* of the B-minor Mass (and not for want of trying); how could a whale sing for thirty minutes and then repeat

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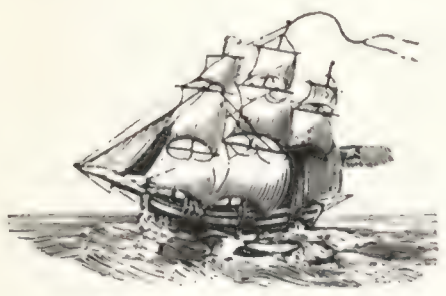

"One hand for the ship, one hand for yourself"! The old sailor's warning cry springs up anew in the Smithsonian Institution's new Hall of American Maritime Enterprise in the National Museum of American History. As you walk through the exhibition, you can almost smell salt water, weathered timber, caulked teak planks, and sense the turbulence of the sea. Elsewhere, you can survey the broad reaches of the Mississippi from the pilot house of a river towboat. America's ocean-going past, as well as the heritage of her inland waterways, can be better understood by visitors of all ages after seeing these artifacts ranging from the time of the Mayflower to World War II's shipyards.

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itself accurately? . . . But then I remembered the whale's metabolic rate, the enormously slow pace of its life compared with ours. . . . A humpback may scale the world to its own metabolic rate; its half-hour song may be our minute waltz."

Gould's own intellectual hero, Charles Darwin, wrote the words that apply to *The Panda's Thumb*: "There is grandeur in this view of life."
—David Quammen
Montana-based writer

The Bitter Pill
Martin R. Lipp, M.D.
Harper & Row, $10.95

This is an important yet melancholy book, melancholy not only in its theoretical assessment of the American health-care system, but in its practical demonstration of what that system and its critics have already done to one victim—the author. For *The Bitter Pill* is not your standard yap about greedy doctors, undertrained (or overtrained—it doesn't matter much to the critics) specialists, dangerous drugs and expensive hospitals. Instead, it's a *cri de coeur* from the other side, a physician's testament to what the continuing drumfire of criticism has done to a sample of physicians, and to Martin Lipp in particular.

Dr. Lipp has brilliantly turned the standard liberal criticism of medical care back upon itself. You wanted us to practice in large groups, he tells the liberals, and we have done so and thus we have lost a sense of direct responsibility to individual patients. You wanted us to serve patients through such agencies as the Veterans Administration and neighborhood health centers and community mental health centers, and we did so, and we discovered that our primary obligation was no longer to the patient, but to the agency that employed us.

Most ironic of all, the liberal establishment asked the medical community to self-criticize. When we did so, when the American Medical Association began to sponsor regular conferences on "the Impaired Physician" (the doctor disabled by drugs or alcohol or depression), the critics gleefully seized on this as another reason to distrust physicians. The prophecy is self-fulfilling, the perceptions self-motivated: *The Bitter Pill* has already been cited by one reviewer as evidence of the unreliability of American doctors.

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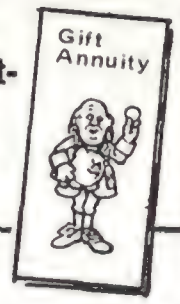

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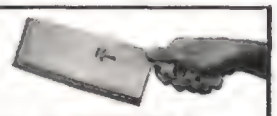

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There is another side to this story, however, the one going back to the magnificent joke about the two New York psychiatrists entering their medical building's elevator at the end of the day—the young psychiatrist haggard and wan, the elderly analyst dapper in Saville Row suit and boutonniere. The young doctor asks, "How can you look so fresh after a day of listening to unhappy people with their horrible problems?" The elder replies, "Who listens?"

In a sense it is true that physicians who have the highest hopes, who try the hardest, who are the most sensitive, are the ones most likely to be eroded by patients who are manipulative ("Just sign this so I can get out of work") or distrustful ("I went back and looked up your medicine in PDR [*Physicians' Desk Reference*] and it says it causes headaches") or just depressed ("Nothing seems to help"). It is also true, as Dr. Lipp documents, that actual frontline patient care is one of the most exhausting of human activities.

When doctors burn out or when they know from the start that they don't have the necessary combination of compassion and toughness—toughness is important—they wander off into administrative medicine or Capitol Hill or bureaucratic jobs, where, eventually, they can control and criticize their betters.

The problem is that Dr. Lipp is too sensitive and, ultimately, too "untough" to give full perspective on medical practice. What is lacking in *The Bitter Pill* is any great sense of the joy of actually practicing medicine, the challenge of making a solid diagnosis, the delight in besting (if only momentarily) an intern or resident, the satisfaction (if rare) of actually helping someone, the sheer cantankerousness of being able to tell the bureaucracy to "stuff it." In a nation where the most conventional of openings is "Who do you work for?" the true physician in true private practice is one of the few who can answer, "No one—except myself and my patients."

As the nation becomes more aware of how institutions per se can stifle creativity, of how bigness per se destroys our sense of community, the private practice of medicine will become increasingly attractive to the talented, tough men and women of tomorrow.

Michael Halberstam, M.D.
Internist in private practice in Washington, D.C., editor of *Modern Medicine*.

Additional reading

Coral reef (p. 34)

Caribbean Reef Invertebrates and Plants by Patrick Colin, T.F.H. Publications (Neptune City, New Jersey), 1978

"Corals and Coral Reefs" by T. F, N. I., T. J. Goreau, *Scientific American*, August 1979

"Coralline City" by Louis H. DiSalvo, *Oceans*, September-October 1972

Joseph Cornell (p. 44)

Joseph Cornell, The Museum of Modern Art (catalog of the exhibition), 1980

Joseph Cornell by Diane Waldman, George Braziller, 1977

A Joseph Cornell Album by Dore Ashton, Viking Press, 1974

Moshe Feldenkrais (p. 52)

Body and Mature Behavior by Moshe Feldenkrais, International Universities Press (New York), 1949

Listening to the Body by Robert Masters and Jean Houston, Delacorte Press, 1978

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Platypus (p. 62)

Monotremes and Marsupials by Larry R. Collins, Smithsonian Institution Press, 1973

The Life and Habits of the Platypus by Robert Eadie, Stillwell & Stephens (Melbourne, Australia), 1935

"Reproduction in Male Monotremes" by Frank N. Carrick and R. L. Hughes, *The Australian Zoologist*, December 1978

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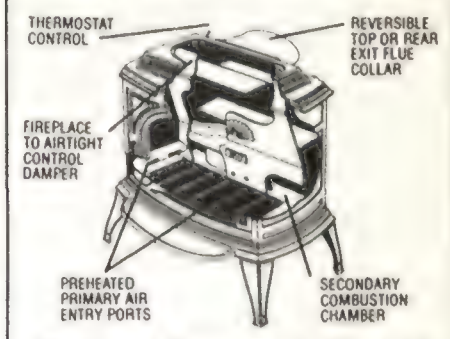
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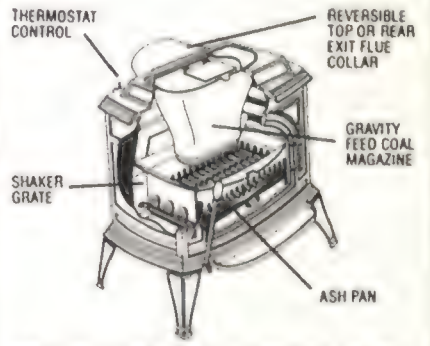

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Dazzling phenomena (p. 72)

Rainbows, Halos and Glories by Robert Greenler, Cambridge University Press, 1980

The Nature of Light and Color in the Open Air by M. Minnaert, Dover Publications, 1954

The Atmosphere by Richard A. Anthes *et al.*, Charles E. Merrill (Columbus, Ohio), 1978

Mummers (p. 80)

Oh! Dem Golden Slippers by Charles E. Welch, Thomas Nelson, 1970

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Churches (p. 107)

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What's Ahead for Old First Church? by Ezra Earl Jones and Robert L. Wilson, Harper & Row, 1974

"As Congregations Dwindle, Properties Change Hands" by Jill Jonnes and Christopher S. Gray, *New York Times*, September 30, 1979

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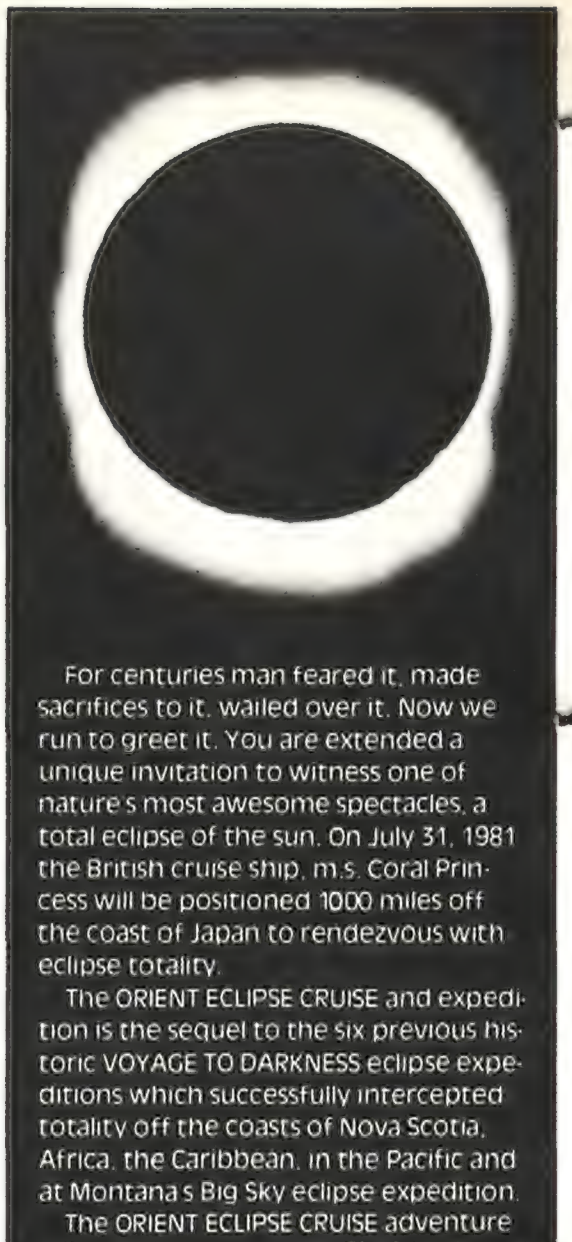

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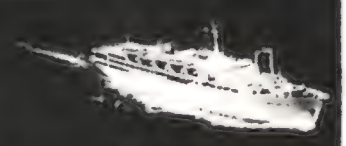

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Smithsonian highlights

A 55-pound Brazilian tourmaline crystal, appraised at $15 million, is the newest attraction in the Natural History Museum's Gem Hall. The extraordinary specimen (p. 134), on loan to the Smithsonian, was discovered in a mine owned by a Brazilian farmer and purchased by three American private collectors. Called "The Rocket" because of its cylindrical shape, the crystal weighs more than 50,000 carats and is considered the most valuable mineral specimen on display in the world.

Special January events

National Air and Space Museum

West Gallery—New exhibit features five aircraft (p. 136).

The Magnetospheres of the Planets (January 28, 7:30 P.M.)—Wernher von Braun Memorial Lecture by James Van Allen.

Test-Flying Luftwaffe Aircraft (January 23, 7:30 P.M.)—Lecture.

Happy Birthday, Asteroids! (January 3, 9 A.M.)—Monthly sky lecture.

Space Films (January 16, 30; 7:30 P.M.).

Museum of African Art

Traditional Art of Cameroon, Angola and Gabon—Selections from the Permanent Collection.

Animals in African Art.

National Museum of American Art (formerly National Collection of Fine Arts)

Twenty Painting Poems by Sheila Isham (January 30-April 5)—Calligraphy depicting the essence of lines from T'ang poems.

Jan Matulka, 1890-1972 (ends February 8).

Art for All: American Print Publishing Between the Wars (through May 10).

Anacostia Neighborhood Museum

Anna J. Cooper: A Voice from the South (opens January 15)—Documents, photos, artifacts and text present a picture of this black woman educator of the late-19th and early-20th centuries.

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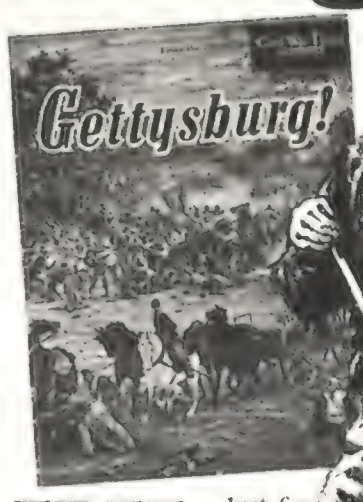

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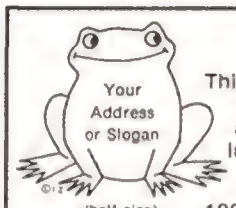

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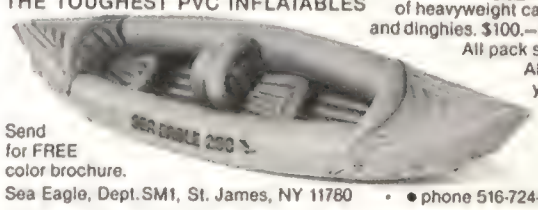

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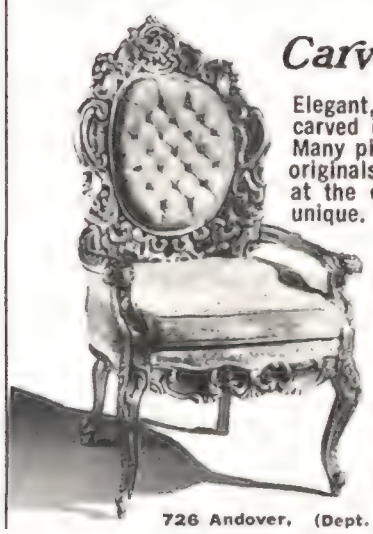

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National Museum of Natural History
The Rocket—Tourmaline crystal (below) valued at $15 million added to Gem Hall.
Coral Reef—Living reef (p. 34).
Elizabeth Gwillim Paintings (January 31-March 29)—Sixty paintings of Indian birds by this artist and naturalist.
Film and Lecture Series (Fridays, noon)—For information, call 357-2700; includes lecture, "Indians in the Arctic" by curator William Fitzhugh, January 16.

Renwick Gallery
A Feast of Color: Corpus Christi Dance Costumes from Ecuador (January 9-July 12)—Includes four dressed figures, textiles, masks, paintings on leather related to festival activities.
American Porcelain (through August 16)—Major show by 108 contemporary artists.

National Portrait Gallery
Bret Harte (January 22-July 12)—Small exhibit includes portraits of this chronicler of California gold-mining days, and drawings of the era.
Time *Collection Selections* (opens January 14)—Portrait covers.
Songs of Stephen Foster—Portraits in Motion series by Kathie and Terrence Gaus-Woollen, January 17, 1:30 and 3 P.M.

Huge Brazilian tourmaline crystal is displayed at Natural History Museum.

National Museum of American History (formerly Museum of History and Technology)
Clockwork Universe (ends February 22)—Some 120 German clocks (SMITHSONIAN, December 1980).
Free Film Series—"The Christians," January 7, 8; "The Naturalists" (Four-part series on Thoreau, Teddy Roosevelt, John Muir, John Burroughs), January 14, 15, 21, 22; "Reflections: Margaret Mead," January 28, 29; all showings, 12:30 P.M.

Freer Gallery of Art
Turkish Art—Textiles, paintings, jades.
Rimpa Screens—Six Japanese screens from the 17th through the 19th centuries.

Hirshhorn Museum & Sculpture Garden
Avant-Garde in Russia, 1910-1930 (ends February 15)—Dramatic collection (SMITHSONIAN, December 1980).
André Masson: Prints (ends February 22).

Musical Weekend in May

The Tenth Annual Musical Weekend, sponsored by the Division of Musical Instruments and the steering committee of Friends of Music at the Smithsonian, will be May 1-3. Hotel accommodations for two nights and all meals are included. For further details and reservations write: Musical Weekend, Room 4124, National Museum of American History, Smithsonian Institution, Washington, D.C. 20560.

Smithsonian events

For tickets to January resident associate events and lectures, call 357-3030:
Victory Over the Sun: The 1913 Futurist Opera by Malevich, Matiushin and Kruchenykh (January 23 at 8 P.M.; January 24, 25 at 1, 3 and 6 P.M.).
The Age of Alexander (January 10)—All-day symposium.
Edward Hopper (January 28, 8 P.M.).
Nepal (January 31)—All-day seminar.
Josef Albers (January 28, 8 P.M.).

For tickets to performing arts events, call 357-1500.
Mystic Paper Beasts (January 8-February 1)—A&I Theater, Wednesdays-Sundays.
Post-Modern Dance: Douglas Dunn—Lectures, performances, film.
A Place to be Somebody (January 15-18)—Revue celebrates the black entertainers of the Twenties and Thirties.
Solo Jazz Piano (January 3, 6 P.M.)—Ellis Larkins, Jimmy Rowles and Tommy Flanagan.
Lee Konitz Nonet (January 31, 6 P.M.)—The "cool jazz" of the Forties.

Regional events

Lectures on marine biology and performances of American folk music will be among the National Associate Program's Regional Events in Tampa and St. Petersburg, February 10-16. Associates who spend the winter in Tampa or St. Petersburg but receive the magazine elsewhere may request invitations by writing to: Regional Events, 1208 A&I, Smithsonian Institution, Washington, D.C. 20560.

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Mesa, Arizona (January 24-February 22)—*Jupiter and its Moons,* Mesa Museum.
Phoenix (January 10-February 22)—*Paintings of the Figure from the National Academy of Design,* Phoenix Art Museum.
Los Angeles (January 10-February 8)—*Bridges, Tunnels and Hydraulic Works,* University of California.
Ojai, California (January 17-February 15)—*A Cartoon History of U.S. Foreign Policy, 1776-1976,* Thacher School Library.
Gainesville, Florida (January 10-February 14)—*Collages: Selections from the Hirshhorn Museum and Sculpture Garden,* Santa Fe Community College.
Shreveport, Louisiana (January 18-March 1)—*Sèvres Porcelain,* The R. W. Norton Art Gallery.
Hagerstown, Maryland (January 3-February 1)—*American Drawings II,* Washington County Museum.
Minneapolis (January 24-February 22)—*Gráficas: Contemporary Latin American Prints,* University of Minnesota Gallery.
Jackson, Mississippi (January 24-February 22)—*Story of a Goblet,* Uni-First Federal.
El Paso (January 3-February 1)—*World Print III,* El Paso Museum of Art.
Eau Claire, Wisconsin (January 24-February 22)—*The Hand of Man on America,* University of Wisconsin.
Burnaby, British Columbia (January 3-February 1)—*Musical Manuscripts,* The Simon Fraser Gallery.

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Marine ace "Pappy" Boyington flew an F4U Corsair in the Pacific war.

Excalibur III was a record-setting racer, also crossed the North Pole in 1951.

One young visitor to the National Air and Space Museum (NASM) wrote that what she liked best was the "Jaws airplane." That was a few years ago. The Curtiss Warhawk with its menacing grin is back on display, along with four other old restored fighters. The exhibit is part of a scheme to rotate some of the more than 275 aircraft in the NASM collection. Fewer than 70 can fit in the museum; most are kept at the Paul E. Garber Preservation, Restoration and Storage Facility at Silver Hill, Maryland.

The new exhibit is in the West Gallery, the one with the big door. "As we restore planes, we can move them fairly easily in and out of that gallery," says Don Lopez, chairman of the aeronautics department. "These five fighters are popular, pretty, and they fit."

Because most warplanes were scrapped, many of the NASM specimens are rare. The Grumman *Gulfhawk II* on exhibit, a sturdy little aerobatic biplane from the mid-Thirties, is the only one of its kind. The Boeing P-26A, the first American monoplane fighter, was recovered from the Guatemalan Air Force in 1954.

The F4U Corsair, identified with Major Gregory "Pappy" Boyington's "Black Sheep" squadron, was an important carrier-based fighter in the Pacific. The Curtiss Warhawk won fame flying over China, six guns supplementing its scowl. The restored version (right) was given the tail number of Lopez's own plane, which he flew with the Flying Tigers from 1943-45. The North American P-51C *Excalibur III* is famous for the first solo flight across the North Pole by Captain Charles Blair.

The sparkling exteriors of these planes are more than matched by the interiors. Smithsonian's restoration work emphasizes anticorrosion, rebuilding, chemical coatings, authentic equipment. "If the plane comes in 'plain vanilla'—with no combat record—we restore it to represent its most famous role," says Lopez. "And if a star is an inch too large, you can be sure some airplane buff will know." Nowadays, these planes don't fly. Says Lopez, "We have to preserve the collection."

—Carol Simons

Restored Warhawk gets fresh teeth.

Technician adjusts cowling on Corsair.

The Queen to Europe.

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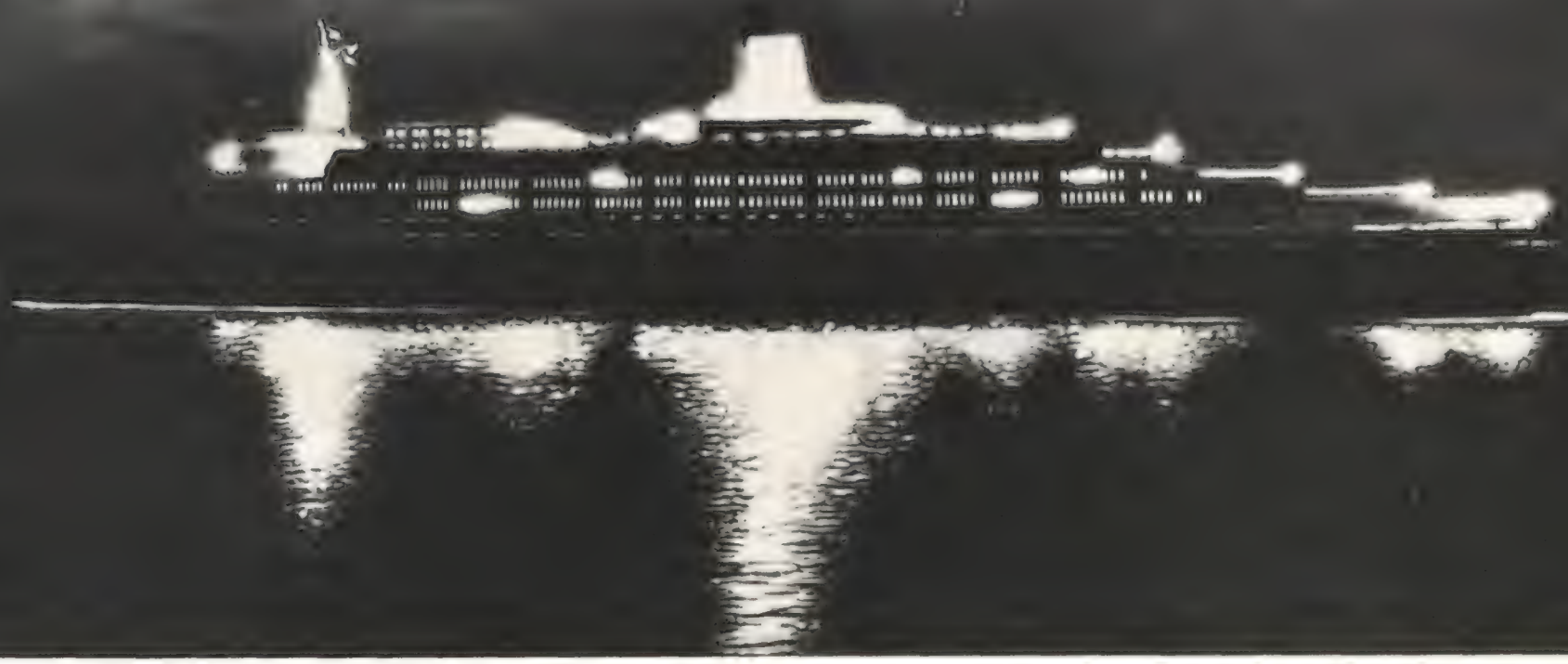

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Domestic Study Tours

These tours offer specialized guidance and expertise generally unavailable to persons traveling on their own:

Virgin Islands Adventure—January 12-21 or January 21-30: Chartered sailboats provide bases for exploring the Caribbean and spectacular coral reefs.

Yellowstone in Snow—February 20-March 1: Cross-country skiing in Jackson, Wyoming, and Yellowstone National Park to discover the splendors of nature.

Smithsonian Arts Weekend—March 6-8: Examine diverse art collections including *The Search for Alexander.*

Tetons Winter Ecology—March 31-April 8: In cooperation with the Grand Teton Environmental Center, study the delicate balance of nature in winter. Includes cross-country skiing, day and evening programs.

New York—April 2-5 or April 9-12: Exciting weekend features new American wing at Metropolitan Museum of Art.

Jefferson's Virginia—April 8-14: Trace development of American architecture with visits to Williamsburg, Charlottesville and Richmond.

Mississippi—April 27-May 4: Relive the history of antebellum South with visits to plantations in Vicksburg and Natchez.

Big Bend—May 2-10: Hike the spectacular canyon trails in this southwest Texas park.

Philadelphia—May 20-24: Museum visits and walking tours of Society Hill, Rittenhouse Square and Fairmont Park.

Southwest Pueblos—May 22-29: Trace the development and blending of Indian and Spanish cultures in New Mexico.

Illinois Archaeology—May 24-31: Join dig which spans nearly 10,000 years. Includes instruction, lab work and field trips.

Bryce, Zion and the Grand Canyon—June 3-11: Study geology and natural history of these dramatic national parks.

Yosemite—June 6-14: Explore the park during its most spectacular season.

San Francisco—June 14-20: Architectural tour with excursions to the coast.

Washington "Anytime" Weekend: Choose any weekend to visit your choice of Smithsonian museums, spend two nights at Loew's L'Enfant Plaza Hotel or Hyatt Regency Washington, each close to the Mall, and see other sights in the city by Tourmobile. Reservations and payments at least ten days prior to arrival.

Foreign Study Tours

These tours range in size from small group experiences to charter adventures and vary in price from low cost to deluxe, depending on the type of travel, destination visited and length of trip:

Guatemala—January 21-February 1 or February 18-March 1: Explore Tikal and other Mayan ruins with an archaeologist.

Micronesia: An Adventure Tour—February 9-28: Unique opportunity to visit unspoiled islands of the South Pacific.

A Hike in New Zealand—February 13-28: Walk the Milford Track; visit other major cities and parks in this scenic country.

New Zealand—February 18-March 6: Tour includes talks on natural history, Maori heritage and a home visit.

Zapotec and Mayan Mexico—March 4-15 or March 18-30: Diverse archaeological sites, museums and local markets.

Morocco—March 6-21: See the medinas and markets of Rabat, Meknès, Fez, Marrakesh and Casablanca as well as the stark Roman ruins of Volubilis.

Ecuador and the Galápagos Islands—March 22-April 2: Visit Quito, then travel by train to Guayaquil to board the *Bucanneer* for a seven-day study voyage through the famous islands.

Mediterranean Spring—April 25-May 6: Join lecturers aboard MTS *Argonaut* for a study of Peloponnesus, Sicily, Malta and Salerno among other sites.

Springtime in Greece—May 3-19: Athens plus visits to the renowned sites of ancient civilization when the countryside is a paradise of wild flowers.

Portugal—May 5-19 or October 6-20: Four days in Lisbon; choice of travel to Alto Alentejo with Evora and fortified hill towns of Estremoz; or old Lusitania with Porto, Coimbra and Viseu.

London—May 10-24: Museums, seminars, walking tours and theater; choice of excursions includes Yorkshire.

Odyssey of Flight—May 21-June 8: Paris Air Show, the Musée de l'Air, Britain's Shuttleworth Collection and more, in the company of curators from National Air and Space Museum.

Malaysia, Borneo and Singapore—May 25-June 12: Kuala Lumpur, Penang and Malacca—plus a choice of travel to the seldom-visited East coast, the remote National Park, or an exciting excursion to the jungles of Borneo.

Wild Highlands of Scotland—May 28-June 13: In cooperation with Aigas Field Centre, study natural history and wildlife of central Highland glens.

Alpine Countryside—June 6-21 or September 12-27: Stay in an Austrian mountain village and learn about this picturesque historic area.

Waterways of France—June 28-July 9: Aboard the MTS *Argonaut,* visit historic ports, walled cities, chateaux and vineyards with expert lecturers.

Wild Wales—July 5-17: Savor dramatic landscapes; visit archaeological sites, fishing villages, mines, manor houses and castles; attend the *Eisteddfod Llangollen* (International Music Festival).

The Lakes of Finland—July 10-26: Celebrate summer with an extravaganza of cultural happenings, including the Savonlinna Opera Festival.

An Alpine Walk—August 2-16 or August 16-30: Hike through the Swiss Alps to study the natural wonders of crystalline peaks, waterfalls and flora.

Oxford/Smithsonian Seminar—September 11-26: Medieval Manuscripts and Oriental Ceramics are among in-depth courses taught by Oxford faculty. Live in Worcester College and join day trips.

People's Republic of China: 13 tours with five different itineraries.

Write National Associates, A&I 1278, Smithsonian Institution, Washington, D.C. 20560 for specific tour/seminar brochures or call (202)

in Washington

Selected Studies Seminars

Treat yourself to a popular program at the Smithsonian that combines excellent speakers and small, specially arranged "behind-the-scenes" tours. Choose from:

The Splendor of Byzantium—February 15-20: The magnificent arts of Constantinople and the vast Byzantine Empire in illustrated lectures, along with tours of the exquisite collections at Dumbarton Oaks (Harvard University's research center) and Walters Art Gallery (Baltimore).

Model Airplanes: Then and Now—February 22-27: Foremost talents discuss every aspect of aeromodeling with an abundance of film clips, slides and actual models at the Air and Space Museum.

American Painting in the 19th Century—March 22-27: Exploration of the achievements of acknowledged masters such as Copley, Cole, Church, Homer, Ryder and Eakins. Includes tours of the Capitol, National Gallery of Art and National Museum of American Art.

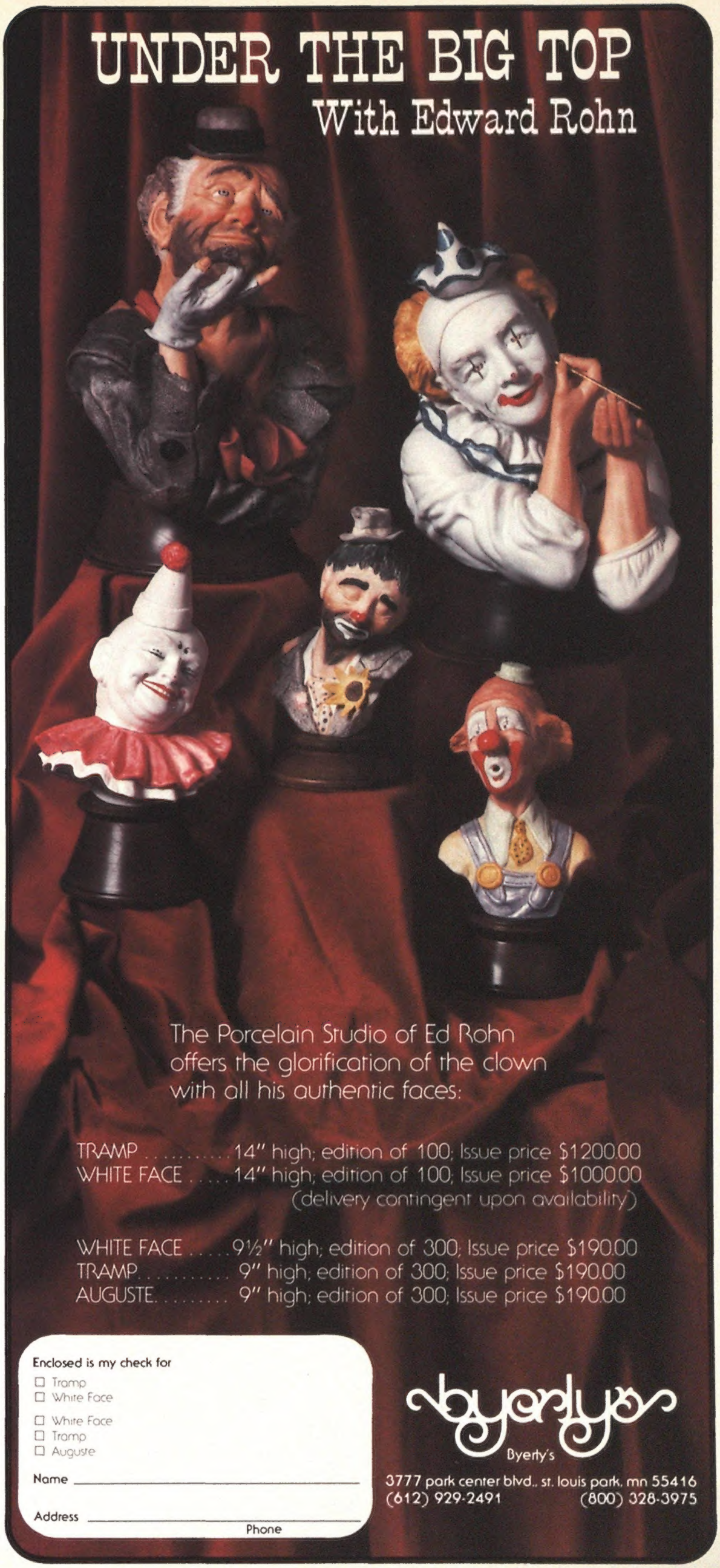
American Antique Furniture—March 22-27: Connoisseurship of masterpieces, 1650-1840. Includes color slides of great collections, detection of fakes, care of antiques, and tours of the elegant Diplomatic Reception Rooms at the Department of State and the Winterthur Museum.

World War II Aviation—March 29-April 3: The outstanding aeronautical staff of the National Air and Space Museum and guest experts offer new insights into how the major air forces of the world came into being, and how quantum jumps in aviation production and performance were achieved. Includes tours to see many of the only surviving World War II planes.

Naval History—April 26-May 1: Famous authorities and authors trace the evolution of the U.S. Navy from the age of sail to nuclear power. Includes films and tours of the Smithsonian's Naval History collections, the Navy Memorial Museum and the U.S. Naval Academy.

Historic Horticulture—May 3-8: Celebrate spring in the lovely 18th-20th century gardens of Mount Vernon, the National Arboretum, Dumbarton Oaks and the du Pont estates of Longwood and Winterthur.

7-2477 (tours) or (202) 357-2475 (seminars).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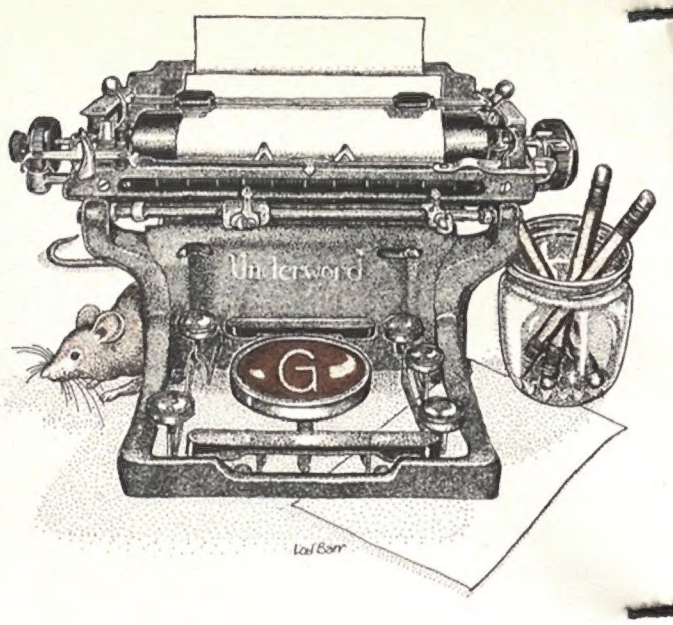
By Patrick Ryan

A few words in behalf of fewer and fewer words



In these garrulous days when the jungles of official verbiage threaten to engulf eternity, it came to me as some small hope for a pithier future to read the press report that the "American Government specifications concerning prospective mousetrap purchases, containing 102,000 words and weighing more than two pounds, have been condensed to a single page." Maybe if we simplify government typewriters, some future edition will be even shorter.

It is not easy for persons not in government service to comprehend how anyone can actually write 102,000 words in description of a mousetrap, since such wordage is not far short of what Jonathan Swift needed to write *Gulliver's Travels* and would have seen Emily Brontë into the finishing stretch of *Wuthering Heights*. Perhaps the compilers of the antiverminous tome had in mind that if there was any delay in the supply of your requisitioned, departmental mousetrap, you could always eliminate the invading mice for the time being by hitting them with the two-pound specifications.

Ghostly applause for the master of the single-page condensation may well be heard arising from at least two noble graves, one in Bladon, Oxfordshire, and the other in Springfield, Illinois. The inhabitant of the English tomb, Sir Winston Churchill, was devoted to brevity on paper and a favorite opening to his wartime inquiries of his top lieutenants was "Pray let me have, by this evening, on one sheet of paper . . ." an account of the state of the tank-production program or some project of similar magnitude.

The other applauder would be President Abraham Lincoln. Wearied by the meandering length of a Congressional committee report on a newly devised gun, he complained that he would need a new lease on life to read through it and declared that, "If I send a man to buy a horse for me, I expect him to tell me that horse's points, not how many hairs he has in his tail."

That Abraham Lincoln publicly practiced what he preached is exemplified in his writing of the Gettysburg Address in fewer than 275 words—and almost 200 of those were words of one syllable. Gary Cooper, at his most taciturn, could barely have been more monosyllabic than that.

President-elect Ronald Reagan joined the battle years ago. The Federal Power Commission, he claimed, had "sent a questionnaire to the gas producers which weighed ten pounds and required 17,000 accountant man-hours to complete." Maybe the FPC reckoned they were dealing with people accustomed to producing quantities of gas and hot air anyway.

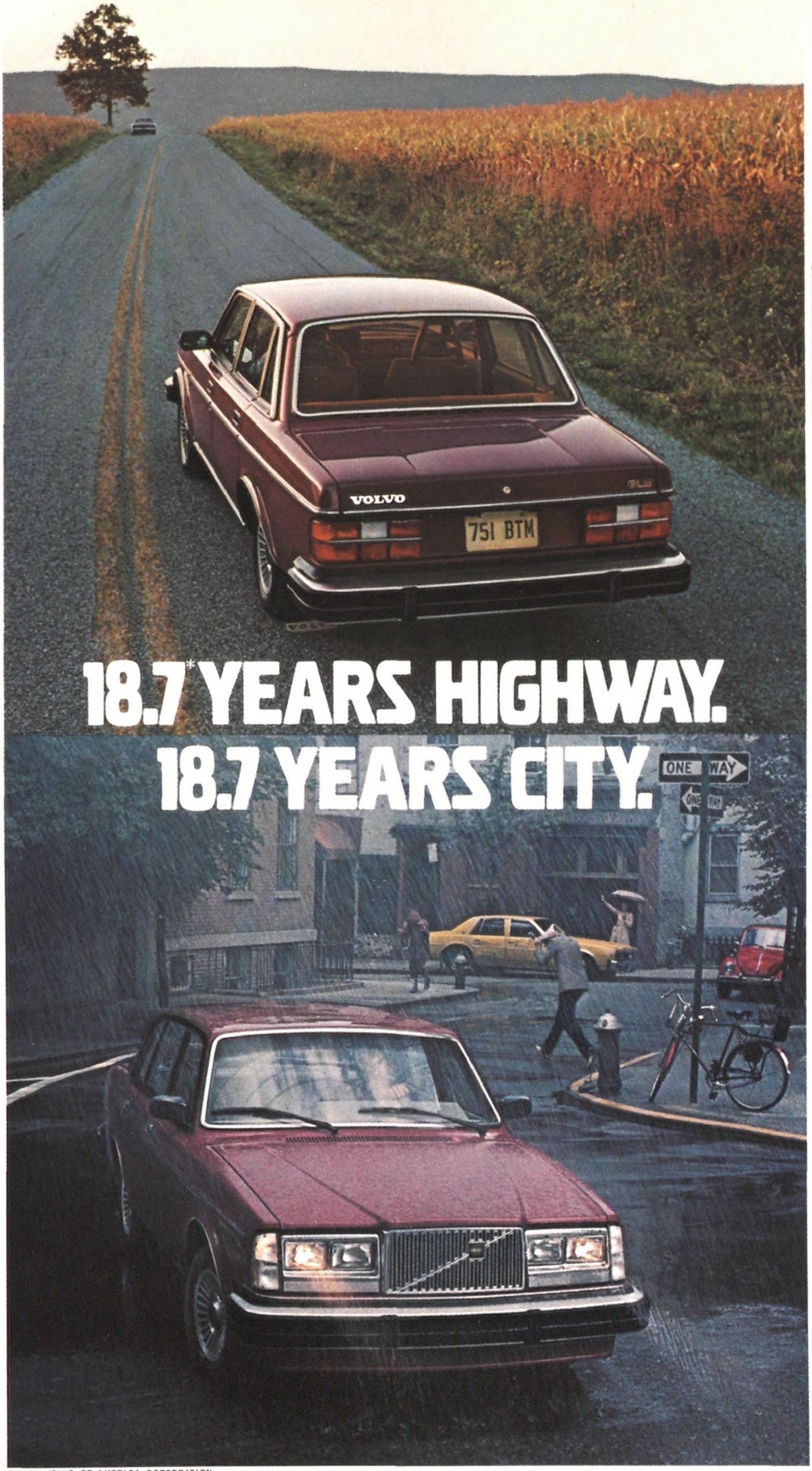
Moving up to the very highest level of authority, it is apparent that the Almighty disposed Himself on the side of the succinct when He contrived to encapsulate the Ten Commandments into just over 300 words. He may, of course, have been encouraged toward concision by the requirement of His line of earthly communication that the letters of the commandments be inscribed upon two tablets of stone. And He might also have been bearing in mind that a second laborious copy of each tablet would have to be made by Moses after he misguidedly smashed the originals.

On down from the days of the Sumerians, when most writing was done on clay tablets, the quantity of official verbiage produced has increased in direct proportion to the facility of its production. Pre-Caxton English bureaucrats were limited in their output of regulations by the onset of calligrapher's cramp in the scribe's fingers. Came the typewriter, the duplicator and the photocopier, and the only restraint left was the speed at which the human voice could gabble gobbledygook.

Solemn warning of this advancing reign of paper terror was given to me long ago by a general under whom I served in World War II. He held that the proper conduct of human warfare had been ruined by the introduction into the armed forces of the typewriter. Before it provided facilities for the swift production of multiple copies, he complained, a commanding officer who attended a pre-battle order group took down in his own hand the vital elements of his general's plan of attack. But, with the mechanized military offices of today, everyone attending for orders is handed 15 duplicated sheets of split-pea information the moment he enters headquarters.

Now the word processor is upon us, the automatic letter writer spews forth infinities of undesired correspondence, and Alvin Toffler advises in his latest book, *The Third Wave*, that computer-operated microprinters already inhabiting the planet can turn out 20,000 lines of verbiage a minute, which is 200 times faster than anyone can read.

In the beginning was the Word, but must it forever go on multiplying? Lest someone complain that I am doing my bit, I will subside to silence, and hit the closing key. Period.



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